UNIVERSITY OF ALBERTA.

ON VAGUENESS

BY

ISTVAN S. N. BERKELEY.

A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS.

DEPARTMENT OF PHILOSOPHY

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FACULTY OF GRADUATE STUDIES AND RESEARCH

THE UNDERSIGNED CERTIFY THEY HAVE READ, AND RECOMMEND TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH FOR ACCEPTANCE, A THESIS ENTITLED "ON VAGUENESS" SUBMITTED BY ISTVAN STEPHEN NORMAN BERKELEY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS.

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Abstract.

Natural language contains expressions which are vague. Some, for example Russell [1923], believe that all of natural language is vague to some degree. Whether or not this is the case is still a matter of controversy. This is not the only debate concerning vagueness to be found in literature on the philosophy of language and logic. Natural language vagueness has motivated attacks upon the acceptability of classical logic in general, as well as assaults upon individual rules of logic. The principle of bivalence and the law of excluded middle have both been pronounced false as a result of arguments based upon vagueness. The ancient sorites paradox is another philosophical puzzle which arises due to natural language vagueness.

Fascinating though these debates may be, to some degree, any proposed answer to a particular conundrum is dependent on the view of vagueness held by its nominator. For this reason, it is surprising that so little attention has been paid to the phenomenon/a of vagueness itself. The purpose of this paper is to take a few steps to remedy this situation.

In my introduction, I give a brief outline of the history of the terms 'vague' and 'vagueness', and sketch some of the difficulties which natural language vagueness is alleged to give rise to. Next, I distinguish vagueness from other features of language with which it is sometimes confused. In

this section I discuss ambiguity, generality, open texture and epistemic failure. Attention then moves to the literature on vagueness. I attempt to show that there is no single notion which is discussed under the head of vagueness. Rather, it seems as if each author has his or her own conception of what vagueness is. In the next chapter I try to take a few small steps towards coming to grips with vagueness. I argue that the primary bearer of vagueness must be expressions. I adopt the traditional distinctions between semantics and pragmatics, and between intension and extension. I then argue that, rather than vagueness being a unitary notion, there is in fact more than one kind of vagueness.

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I

Introduction.

In 1548, Thomas Vicary, Henry the Eighth's 'Serjeant of the Surgeons', published a book entitled The Anatomie of The Bodie of Man. In the first chapter, Vicary [1548: p. 15] advised that Surgeons should be good looking, know anatomy and not be drunkards. He also recommends that,

> "Likewise a Chirurgion must take heed that he deceiue no man with his vague promises, for to make of a smal matter a great, because he woulde be counted the more famous."

Vicary's book is noteworthy, not for its remedies, but for this one sentence. According to the O.E.D. [1961: p. 13], it is the first recorded usage of the term 'vague' in the English language. The term 'vague' either came from the Thirteenth Century French adjective spelt the same way, or is an adaptation from the Latin vag-us. Both words meant wandering, inconsistent or uncertain. The O.E.D. gives the following as the primary meaning of 'vague',

> "Couched in general or indefinite terms; not definitely or precisely expressed; deficient in details or particulars."

The secondary use of the term is to specify a feature of words and language. This use is described as "Not precise or exact in meaning." The first occasion the term was given this interpretation seems to be in 1690, in Locke's "Epistle to the Reader" in the Essay. Locke laments that,

> "Vague and insignificant Forms of Speech and Abuse of Language, have so long passed for Mysteries of Science;"

The third application which the O.E.D. finds for the term "vague" is to ideas and knowledge. In this instance, it is described as "Lacking in definiteness or precision: indefinite, indistinct." Again Locke is given credit for being the first to use the term this way, (in 1704).[1] The term may also be applied to physical forms or outlines, sensations and persons. This innovation is credited to B. W. Proctor in the Flood of Thessaly, (1822), by the O.E.D. Proctor's use of 'vague' was as follows,

> "Chaos, touched with light and form, Lost its vague being.".

'Vagueness', (not used until 1799), has etymological roots and uses similar to the term 'vague'. The O.E.D. describes the primary meaning of 'vagueness' to be,

> "The quality or condition of being vague; lack of distinctness or preciseness; indefiniteness."

The term was first used by Mackintosh in his Study of the Laws of Nature, in the following passage;

> "Notwithstanding the objections of some writers to the vagueness of the language."

The primary interest of this thesis will be the vagueness of language, (that is, the first and second meanings of the

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1 1704 is the date of publication of the fifth edition of the Essay. Locke was working on the revisions of this text up to the time of his death. He had not completed his revisions when he died. The edition was published posthumously.

term suggested by the O.E.D.). The other meanings will for the most part be ignored, as the most interesting questions about vagueness mainly arise with only these first two senses of the term. There can be little doubt that Vicary did not anticipate that four hundred years after he wrote the sentence above, the feature of language he gave a name to would be a focus of philosophical attention. In the words of Ballmer and Pinkal [1983: p. 2],

> "Since about a hundred years ago, language has become a matter of primary interest in philosophy, and, as a consequence, some attention was drawn to the phenomenon of vagueness."

Vagueness is a useful feature of natural language. There are many instances where using vague terms enables us to avoid saying things that we do not want to say. Consider the following noun phrases,

(i) Institutions in financial difficulties.

(ii) Institutions with deficits of at least $4.8 million.

The phrase "financial difficulties" is vague, whilst the alternative formulation in (ii) is much more precise.[2] However, there are circumstances where it would be preferable to use (i) rather than (ii) - in the title of a book, for example. Alston [1964: p. 86] gives two other examples in which natural language vagueness is useful. In the context of diplomacy, it is sometimes advantageous to use vague terms in order to keep options open, or to keep an

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2 This is not to say that it is totally precise however. A case could be made that the term 'institutions' is vague.

opponent guessing. The second example involves a case where the state of knowledge is such that to make a statement in a maximally precise way would involve going way beyond the evidence, or even perhaps falsifying the statement. Alston gives as an illustration the claim "city life imposes much more psychological strain than country life". The term 'city' is vague, yet any precisification of the term (say, by stipulating that a city must have a certain number of inhabitants), would falsify the claim. There is no precise population figure below which community-caused psychological strain certainly will not occur.

This second example could be an instance of an occasion where Gricean [1975: pp. 159-170] conversational maxims come into conflict with one another. The two maxims of quality dictate that one should not say what is false, and that one should also avoid making claims which one has inadequate evidence for. However, there may be a context where the fulfilling of the maxims of quality might dictate that one fails to satisfy one of the maxims of quantity, in particular, the requirement that one's contribution should be as informative as the circumstances require. If this were the case then, although the statement would have both a literal meaning and a conversational meaning, the literal meaning might not have a determinate truth-value due to the inclusion of vague terms (viz, 'city'). The conversational meaning, on the other hand, may well be true. That is, the implicatum (that one could not state the case in a manner

which satisfied the maxim of quantity) may well be true.[3] So, the inclusion of vague terms in natural language enables the expression of statements which are informative, though arguably lacking in determinate truth-value.

Ordinary language philosophers see the vagueness of natural language as being absolutely vital for efficient discourse. Wittgenstein [1953: para. 98] summed up the attitude of ordinary language philosophers to vagueness when he remarked,

> "On the one hand it is clear that every sentence in our language 'is in order as it is'....On the other hand, it seems clear that where there is sense there must be perfect order.-So there must be perfect order even in the vaguest sentence."

Nevertheless, natural language vagueness can be problematic too. Vagueness is not always be desirable. In fact, it can be a positive nuisance, especially if it cannot be got rid of. Cicero [48 B.C.: pp. 67-68] noted that,

> "...there is no matter whatever, concerning which, if questions with gradual increases are put to us (e.g. whether a man is rich or poor, famous or unknown, whether a number of things are many or few, long or short, broad or narrow), we know how much addition or diminution must be made before we can give a definite answer."[4]

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3 I take the circumstances outlined above to be significantly similar to Grice's [1975: p. 165] 'group B' type examples.

4 Cicero is discussing the difficulties which arise with terms from which a sorites paradox can be generated. This type of term is vague, (indeed, they are often cited as the paradigm cases of vague terms). However, as I shall argue in this thesis, this type of term is not the only kind of vague term.

Although Cicero expresses the problem in terms which suggest that the difficulty is epistemic, natural language vagueness is usually understood as primarily giving rise to semantic conundrums. That is to say, for an arbitrary vague predicate F, and an object x which is a problematic case in relation to F (for reasons of the vagueness of F), it is indeterminate whether F(x) is true or false. This is the so-called 'problem of vagueness'.

But what is interesting about this? Why should the fact that certain terms in natural language lack of definite truth-value be considered in any way remarkable? There are many things which are not true or false. Days of the week, tables, chairs and other mundane objects for example cannot be true or false. This is not to claim that expressions or sentences about chairs or days of the week cannot be true or false, rather the things themselves do not have truth-values. One of the major differences between objects and vague terms however, is that vagueness is (primarily) a feature of language. Given that when we argue and reason, (at least in a public forum), we, of necessity, employ language, vagueness can have a direct influence upon our understanding of rationality in a way that objects cannot. In an argument, we need to know whether a premise is true or false before we can decide whether to accept or reject that premise. Furthermore, if we cannot judge the adequacy of the premises of an argument, what hope is there of evaluating the conclusion? This being the case, vagueness should be of

considerable interest to any discipline which, like philosophy, involves the construction and evaluation of arguments in natural language.

Vagueness is of philosophical interest for other reasons also. Montague [1969: p. 280] noted in a response to Dummett,

> "...Mr. Dummett has also called attention to the existence of vagueness, which is a...difficult thing to handle. It is perhaps here more than anywhere else that the formal treatment of natural language presently requires a further development of formal logic."

Classical logic runs into deep difficulties when faced with natural language vagueness. Indeed, a number of writers have argued that the existence of vagueness in language is sufficient to seriously compromise the acceptability of classical logic. Most commonly it is claimed that the law of excluded middle, or the principle of bivalence, or both fail for vague terms. Frequently, when an author attacks classical logic on these grounds, his or her purpose is to justify the proposal of an alternative logic. It is not uncommon for these alternatives to employ a many- or infinitely-valued semantics. Rather than truth being conceived as one side of a simple dichotomy, advocates of this approach argue that it should be seen as a continuum from the most true to the most false.[5] Taking a different tack, other authors argue that vagueness provides a good

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5 For an examples of this see, Lakoff [1973] and Sanford [1975].

reason to limit the scope of logic, so that classical rules of inference only apply to precise terms.

Advocates of both these positions frequently appeal to the sorites paradox in order to strengthen their case. In a sorites paradox apparently true premises, which contain at least one vague term, give rise to a conclusion which is inconsistent with at least one of the premises, despite the fact that the argument appears to be valid. The first group of authors take the sorites as a reductio against classical logic in general. The second group of writers believe this conclusion to be too strong. Frege's position is typical of the second view.

> "...logic must demand sharp limits of what it will recognise as a concept unless it wants to renounce all precision and certainty. Thus a sign for a concept whose content does not satisfy this requirement is to be regarded as meaningless from the logical point of view."[6]

(Just prior to this section, Frege cites the sorites paradox.) The controversy between these two views is far from settled. But both sides agree that natural language vagueness raises severe problems for classical logic. Thomason [1970: p. 12] notes that,

> "...there are no simple recipes for translating natural language into logical systems."

One of the reasons this is the case is because natural language is vague, whilst (classical) logical systems are

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6 This quote comes from a letter Frege wrote to Peano, dated the 29th of September, 1896. See Frege, [1980: p. 115].

not. Vagueness may even be problematic when translating between two natural languages. Mates [1950: p. 116] points out that in order for a translation from one language (L_1) into another (L_2) to be adequate, the translation must preserve sense. That is to say, sentences which are true in L_1 must be true in L_2, and sentences which are false in L_1 must be false in L_2. However, vague sentences do not appear to be straightforwardly either true or false. It might be conjectured that a vague sentence of L_1 should be translated into a vague sentence of L_2; however there is no guarantee that this will be possible, for it is not necessarily the case that the two languages will contain terms so synonymous that they are both vague to the same degree. Thus, another reason to investigate vagueness is that a deeper understanding of it may go some considerable way to assist a translator in making the difficult decisions this kind of situation can give rise to.

Vagueness is often seen as an especially troublesome feature of natural language, because it is so common. Indeed, Russell [1923] and a number of other writers (E.g. Alston [1964]), have gone as far as to claim that all language is vague to some degree. If this were the case, then any adequate theory of meaning for natural language would have to reject a classical two-valued semantics, for any and all uses, and instead have some more complicated semantic theory as its base. On the other hand, if vagueness is only a feature of a limited portion of language, it may still be

feasible to retain bivalent semantics. So, the scope of vagueness plays a role in the determining what kind of theory of meaning would be adequate for natural language. And this question in turn is closely related to the points made above about logic.

Given that vagueness raises such important and deep questions, in particular in the philosophy of language and the philosophy of logic, it is not surprising that it has received much attention. But despite the time and energy expended on these questions, satisfactory answers still seem to be some way off. One reason for this sorry state of affairs is, I believe, that insufficient attention has been paid to the phenomenon/a of vagueness itself. The lack of a clear direction on the problems raised by vagueness can plausibly be accounted for by the fact that there is considerable uncertainty about what vagueness actually is. There are a number of linguistic phenomena which from time to time get confused with vagueness. I will first describe the most significant of these (ambiguity, generality, open texture and epistemic failure), and show how they may be distinguished from vagueness.

One of the most striking impressions one gains from reviewing the literature on vagueness is how often writers simply assume that the reader knows what he or she means by the terms 'vague' and 'vagueness'. Very few pages are spent considering and explaining precisely what vagueness is. Even

basic issues, such as identifying the primary bearer of vagueness, are often left unaddressed. By discussing the literature on vagueness, I will show how little consensus there really is on the topic. This may go some way to explain why it is that there is such a plethora of incompatible solutions proposed for the various difficulties to which vagueness gives rise.

Once the conceptual anarchy of the literature has been exposed, I will attempt to take a few preliminary steps towards a better understanding of what vagueness is. Much of the confusion which surrounds vagueness has its origin in the fact that it is seldom recognised that there is more than one kind of vagueness. I will outline three different types of vagueness. This list is by no means supposed to be exhaustive, and it may well be the case that other types of vagueness await identification. However, before there can be any real progress with general solutions to the problems that vagueness presents, some at least of the pretheoretic notions of vagueness must be abandoned. I hope that what I argue here will be sufficient to show this, and will also serve as a small step towards a theoretical understanding of the feature of language which Vicary named 'vague'.

II

What vagueness is not.

If a vague sentence is applied to a penumbral case, the sentence cannot be assigned a truth-value in a non-arbitrary way. But, vagueness is not the only feature of language which brings about semantic failure. There are a number of ways in which a particular sentence may fail to have a straightforwardly determinate truth-value. Natural language has a range of features which are sometimes confused with vagueness. For example, Copi [1978: p. 129] notes that vagueness is sometimes muddled with ambiguity, and vice versa. Before giving a positive account of what vagueness is, I shall adopt a *via negativa*, and (briefly) specify what vagueness is not.

In much of this chapter, the notion of meaning will play a significant role. It is worth making a few remarks about this notion before beginning. 'Meaning' can be construed in a number of ways, dependent upon the theory of meaning adopted. In the current chapter I will, for the most part, adopt an extensional or referential theory of meaning. This strategy requires some explanation, as extensional theories of meaning are generally considered woefully inadequate.[1] I employ an extensional theory of meaning here as doing so considerably simplifies exposition. Furthermore, the

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1 For a number of the standard objections against purely referential theories of meaning, see Fodor [1977]. Also, I will briefly discuss some of the problems which arise with extensional theories of meaning in a later chapter.

difficulties which extensional theories of meaning run into when proposed as general theories of meaning, do not, for the most part, affect the current project. In a later chapter it is necessary to use a more sophisticated intensional theory of meaning, however here a simple extensional theory is adequate. It is uncontroversial to claim that if two sentences or terms have different extensions, then they also have different meanings. Provided it can be shown that there is (at least potentially) a difference in reference between two terms, then it is reasonable to conclude that there is a difference in the meanings of the terms. As difference is all that needs to be established here, a referential theory of meaning will be sufficient.

It should also be mentioned at the outset that a particular sentence may fail to have a determinate truth-value for more than one reason. A syntactically ambiguous sentence, for example, may also contain vague terms. Consider the sentence;

(i) Charles saw Diana drunk.

Sentence (i) can either be read two ways. It could either mean that 'Charles saw that Diana was drunk', or it could mean that 'Charles drunkenly saw Diana'. On one reading, it would be necessary for Charles to be drunk to make sentence (i) true, on the other reading Diana's intoxication would be necessary for the truth of (i). However, the term 'drunk' is

vague.[2] Even if the syntactic ambiguity can be resolved, the truth of the sentence could still be uncertain in some cases, due to the inclusion of the vague term 'drunk'. This is just to say that vagueness and the other kinds of semantically problematic features of language can co-occur within the same sentence.

1. Ambiguity.

Ambiguity may cause a sentence to have a non-determinate truth-value. An ambiguous natural language sentence has more than one set of truth conditions. Quine [1960: p.129] notes that,

> "Ambiguity differs from vagueness. Vague terms are only dubiously applicable to marginal objects, but an ambiguous term such as 'light' may be at once clearly true of various objects (such as dark feathers) and clearly false of them."

There are a number of different types of ambiguity.

1.1. Lexical Ambiguity.

Quine's example of the term 'light' is an instance of a lexically ambiguous term. This type of ambiguity is also sometimes known as 'referential ambiguity'.[3] A lexically

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2 What quantity of wine/beer/spirit has to be consumed by an individual, in order for them to count as being drunk? Alternatively, what behavior would a person have to exhibit in order to count as being drunk?

3 Bunt [1985: p. 112] notes that it can be argued that certain non-referential terms (e.g. 'and' and 'the'), are lexically ambiguous. For this reason, he prefers to use the term "referential ambiguity". However, as the terminology 'lexical ambiguity' is more often used in literature on this type of usage, for the sake of clarity I shall continue with the more traditional terminology. This usage should not be

ambiguous term has more than one possible meaning. That is to say, speaking extensionally, a lexically ambiguous term denotes more than one distinct set of objects. There are instances in which one meaning of a particular term denotes a set which is a proper sub-set of the set denoted by another meaning. Words which exhibit this feature are described as being autohyponymic.[4] The term 'man', for example, on one reading, may refer to the class of all human beings. Alternatively, it may refer to the class of all male human beings.[5] Another more radical example of an autohyponymic word is the term 'Yankee'. 'Yankee' may refer to an inhabitant of the USA, an inhabitant of the Northern United States, and inhabitant of New England, or even a Federal soldier in the American civil war. The terms 'dog' and 'drink' are also autohyponymic. More usually however, lexically ambiguous terms refer to disjoint classes. When dealing with expressions containing lexically ambiguous terms, disambiguation is required before the truth or falsity of the expression can be determined. Indeed, disambiguation may be necessary in order to make a sentence or statement intelligible. Consider,

> (ii) I walked along the bank of the Thames on my way to the bank.

The meaning of the first occurrence of 'bank' in (ii) is forced by '...of the Thames...', however, the second

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problematic, as none of the terms I consider in this section are non-referential.

4 According to Gillon [1990: pp. 10-11].

5 I owe this example to FJP.

occurrence of 'bank' could either be a slope or a financial institution. Disambiguation is a necessary condition for determining whether or not (ii) is true.

Lexical ambiguity is a fairly common feature of terms in natural language. Fortunately, it is often the case that when we meet lexical ambiguity in mundane discourse, the context will enable us to tell which of the meanings is intended. Consider the sentence,

(iii) Winston is keeping a book.

The term 'book' here is lexically ambiguous. Sentence (iii) could either mean that Winston is taking bets, or alternatively that he has some literary work in his custody. For convenience, I shall call the first meaning "$book_1$" and the second "$book_2$". Obviously, the state of affairs which would make the first reading true is different from that which would make the second one so. If another speaker posed the question,

(iv) What is Winston up to these days?

And sentence (iii) was the response to (vi), the questioner should be able to implicate that the term 'book' in sentence (iii), was intended to be $book_1$. If the term 'book' in sentence (iii) was interpreted as $book_2$, the utterer of sentence (iii) would be violating Grice's [1975: p.162]

first maxim of quantity.[6] However, if sentence (iii) was the response to the question,

(v) What is Winston doing with that bag?

The intended sense of 'book' in sentence (iii) would have to be $book_2$, otherwise the respondent would be violating the maxim of relation. Needless to say, context does not always enable us to disambiguate. Sometimes in conversation we have to ask the utterer of an ambiguous phrase or sentence to disambiguate.

This kind of ambiguity may be roughly captured by the following definition.

> A term is lexically ambiguous iff its denotation on one occasion of its use is non-identical with its denotation on another occasion of its use.

Unfortunately however, this cannot be a general definition of ambiguity, as there are other kinds of ambiguity which falls outside its scope.

1.2. Syntactic Ambiguity.

Expressions in natural language, are sequences of words. A particular expression does not overtly display its syntactic structure. There is a class of sentences which may plausibly be interpreted as having more than one syntactic structure. Expressions of this type are syntactically ambiguous. Syntactic ambiguity is entirely independent of the ambiguity

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6 Note the speaker of sentence (iii) might also be accused of violating the second maxim of manner.

of the terms which make up the expression, (although the two types may be found together). When a sentence can accommodate more than one distinct phrase structure, that sentence is said to be amphibolous.

This kind of ambiguity often arises when the scope of a modifier is unclear. Consider,

> (vi) Rosicrucians and Pagans wearing black robes walked through the village.

Here, the noun phrase is syntactically ambiguous. It is unclear whether both the Rosicrucians and the Pagans were wearing black robes, or whether only the Pagans wore black robes. A common way of bringing out this kind of ambiguity is by the use of brackets.[7] Using this convention, the two readings of (vi) can be clearly shown.

> (vi^{*}) [[Rosicrucians and Pagans] wearing black robes] walked through the village.
>
> (vi^{**}) [Rosicrucians and [Pagans wearing black robes]] walked through the village.

The reading given to (vi) will obviously determine which states of affairs would make it true. If (vi) was read as (vi^{*}), and it happened that the Rosicrucians were not wearing any robes at all, or were wearing robes of, say red, then (vi) would be false. But under the same set of circumstances (vi), read as (vi^{**}) would be true, provided Rosicrucians and Pagans did walk through the village, and the Pagans were attired in black robes. It is worthy of note

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7 See Bunt, [1985: p. 112], or Gillon [1990: p. 11], for examples.

however, that some syntactically ambiguous sentences of this kind can be true under any state of affairs. This is the case with the sentence in (vii), as (vii) is a logical truth.

(vii) Rosicrucians and Pagans in black robes are Rosecrucians and Pagans.[8]

This kind of ambiguity is often encountered in daily life. It is not uncommon to see a sign saying, for example,

(viii) Cold Beer and Wine Store.

(viii) is ambiguous in just the same way as (vi). The scope of the term 'cold' is unclear. However, there are some sentences which exhibit syntactic ambiguity, although not for the same reasons as (vi) or (viii). These sentences are syntactically ambiguous, but cannot be shown to be so by different bracketings. The sentence,

(ix) Eating pigs can be messy.

is an example of one such sentence. The ambiguity of (ix) derives from the two possible readings of 'eating'. If 'eating' is taken as having an adjectival use in (ix), then (ix) can be read as informing the reader that when pigs eat they have the potential to make a mess. On the other hand it is equally legitimate to read 'eating' as a participle. In this case, (ix) can be read as informing the reader that the consumption of porcine meat may be a messy business. This kind of syntactic ambiguity Bunt [1985: p. 112] describes as

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8 This fact is noted in Gillon, [1990: p. 12].

being "deeper" than the other type.[9] Bunt [1985: p. 112] also gives an example of this second type of syntactic ambiguity which derives from the fact that some verbs can be read as relating to the rest of the sentence in different ways. He gives the well known example,

(x) I heard the shooting of the hunters.

In (x), if 'shooting' is read with 'the hunters' as its object, then it is the hunters who are being shot. Alternatively, if 'the hunters' is read as the subject of 'shooting', then the hunters are the ones doing the shooting.

Further discussion of syntactic ambiguity is not called for in the current context. It should be clear from the above, and become clearer from what follows, that the problems which syntactic ambiguity can give rise to are very different from those which occur because of vagueness. An individual term may be vague; syntactic ambiguity on the other hand, can only arise in the context of a sentence or a phrase.

1.3. Other Kinds of Ambiguity.

Lexical ambiguity and syntactic ambiguity are not the only kinds of ambiguity. For example, there is another kind of

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9 Most of my discussion on this second kind of syntactic ambiguity is based upon Bunt's. Bunt presumably calls the second kind of syntactic ambiguity "deeper" because the different possible meanings cannot be brought out by the use of brackets.

ambiguity which is similar to lexical ambiguity. Grice [1975: p. 167] called this variety "phonetic ambiguity". This occurs in spoken languages when two terms sound the same, but have different meanings. For example, the two terms 'dear' and 'deer' sound the same. There may be instances where a speaker may say "I have lost my dear/I have lost my deer", and the hearer will be uncertain whether a loved one or a woodland animal has been misplaced. Another well known example of this kind of ambiguity is, "I stink/Iced ink". Grice gives the example, "I have Sind/I have sinned".

Yet another type of ambiguity is what Bunt [1985: p. 113] calls "structural semantic ambiguity". In cases which have this kind of ambiguity, the concepts which the words of a particular sentence stand for, can be related to one another, semantically, in different ways. These different semantic relations are not made obvious by the structure of the sentence. Sentence (xi) exhibits structural semantic ambiguity.

(xi) Those lights are bright.

Sentence (xi) can be read to mean that each individual light is bright, or that the lights in combination are bright. Bunt [1985: p. 113], following common usage, calls the first interpretation 'distributive' and the second 'collective'.

Ambiguity is not just limited to the types described above. For example, Black [1952: pp. 194-195] also identifies what

he terms "process-product ambiguity". The purpose of the current discussion is to distinguish ambiguity from vagueness. Rather than discussing every possible kind of ambiguity individually, a more direct route would be to find a definition of ambiguity which is general, and yet is sufficient to distinguish ambiguity from vagueness, if such a definition is possible. Gillon [1990] suggests that it is possible to give a definition of ambiguity which is able to capture all the different kinds of ambiguity. Furthermore, Gillon's definition is sufficient to distinguish between ambiguity and vagueness (according to Gillon [1990: pp. 25-26]). The definition which he offers goes as follows,

> "An expression is ambiguous iff the expression can accommodate more than one structural analysis." Gillon [1990: p. 13].

A 'structural analysis' is an abstract syntactic entity. It is a phrase marker which consists of a finite set of partially ordered nodes. Non-terminal nodes represent syntactic features, such as syntactic category, whilst terminal nodes are the addresses of lexical entries, including any lexical syntactic information. The structural analysis of a particular expression is encoded into that expression. If an expression has more than one structural analysis encoded into it, then that expression is ambiguous.

Gillon's definition is adequate for the current purpose, as it is sufficiently general to handle most examples of ambiguity, and it enables vagueness and ambiguity to be

distinguished. If the object referred to in sentence (xii) is a penumbral case of a 'heap', then sentence (xii) will clearly be vague.

(xii) This is a heap.

However, if (xii) can only accommodate one structural analysis, then, from the above definition, it is not ambiguous. There is one further complication which deserves a mention before moving on to the next section. The definition of ambiguity given above, in combination with an extensional theory of meaning, under certain circumstances will not succeed in differentiating vagueness and ambiguity. If the meaning of a vague term is taken to be a (possibly infinite) disjunction of extensions, then the above definition will not be adequate to show ambiguity and vagueness to be distinct.[10] On this interpretation, (xii), for example, would accommodate considerably more than one structural analysis. This view is of considerable philosophical interest and is discussed in the literature on vagueness (see for example, Fine [1975: pp. 282-283]). However, this attitude towards vagueness is not the only one possible. It is also feasible to maintain that vague terms (like heap in (xii)), only have one correct structural analysis. To borrow an analogy from Fine [1975: p. 283], rather than seeing vagueness as being similar to a case of many pictures super-imposed upon one another, vagueness can

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10 I am grateful to Mohan Matthen for pointing out this objection.

also be viewed as being more like an unfinished picture. It is this second interpretation of vagueness which I explore throughout this thesis, as it seems to be the position most commonly adopted in the literature on vagueness. This second view of vagueness does enable vagueness to be resolved from ambiguity using Gillon's definition.

2. Generality.

Another feature of language which is important in the context of a discussion of vagueness is generality. Vagueness and generality are sometimes confused.[11] We can make general statements of the form of 'All x's are F'. This is one kind of generality, the kind which quantification theory is concerned with. This however, is not the kind of generality which is of interest here. The sort which is salient in this context is the type indicated by the modifier 'general' in the expression "general terms". Imagine a proper name H, which stands for an object p. Suppose also that H has no other use than to stand for p, and never has, nor never will have any other use in any language. Russell's [1923: p. 86] example of 'Mr. Ebenezer Wilkes Smith', might be an example of a term similar to H. H is not general. H and p stand in a one-to-one relation with one another. Terms which are applicable to more than one object are general. Most of the terms in natural language

11 Assuming the position argued for below is correct, this would seem to be the mistake made by Russell [1923].

exhibit generality in this sense. Rather than denoting one individual object, they denote a whole class of objects.

Consider a mundane English word like 'chair'. When it is used in a sentence like,

(xiii) This is a chair.

its utterer is stating that one particular object is a member of the class of things which fall under the term 'chair'. If the set picked out by a particular term has more than one member, then that term is general. Only singleton sets, like that picked out by H, are not general to some degree. One might propose a definition of this type of generality as follows,

> A term, G, is general, iff G stands for a set with more than one member.

On this definition, H would fail to be general. Moreover there is little danger of ambiguous terms being confused with terms which are merely general. Suppose a term, A, was ambiguous, it is feasible that the phonic units or the graphic representation (i.e. the sound or the written word) of A may stand for two (or more) distinct sets, although one set may be general, the other(s) need not be. If A had one reading, A_1, in which it was a synonym for H, according to the definition given above, the other readings, A_2 to A_n, are not precluded from being general.

The definition of generality given above is not entirely free from difficulty. It may well be the case that

substantial revision would be necessary in order to meet with every last problem and difficulty. This need not be of too great a concern here however, as the main purpose is to show that generality and vagueness can be differentiated from one another. This can be achieved using the proposed definition. It will be the case that many terms which are vague are also general. However, it is also possible that non-general terms can be vague. Consider the proper name 'Beijing'. There is only one Beijing, so the set which the term 'Beijing' stands for only has one member. Hence, 'Beijing' is not general. Nevertheless, the term 'Beijing' is vague.[12] For example, it is uncertain whether or not Da Xin should properly fall within the scope of the term 'Beijing'. (I.e. it is uncertain whether or not Da Xin is part of Beijing). So it is possible to distinguish vague terms from general terms, although any particular term may have both properties.

It is worth noting at this point that this is not the only conception of 'general term'. An alternative notion is that offered by Quine [1960]. According to Quine's view, a 'general term' is one which is suitable for describing the possibility of having more than one bearer. This use of

12 It is not that 'Beijing' is ambiguous between different sets of qualifying conditions for a particular place being part of Beijing. There is something, in principle, defective with the conditions for something being part of Beijing. This will become clearer, when I discuss the different types of vagueness below. The vagueness here arises for the same reasons that the general term 'city' is vague. For a discussion of vagueness of the term 'city', see Alston, [1964: p. 86 and pp. 90-91].

'general term' is contrasted with a correspondingly different notion of a 'singular term'. A term is a 'singular term', according to Quine's conception, only when there can be exactly one bearer to which that term applies. Quine [1960: p. 95] notes that,

> "...the difference between being true of many objects and being true of just one is not what matters to the distinction between general and singular."

According to the way Quine makes the distinction between singular and general terms, 'person', 'unicorn' and 'natural satellite of Earth' are all general, whilst 'W. V. Quine' and 'the senator of Nebraska' are singular. However, Quine's distinction does give rise to cases which are problematic. For example, according to Quine [1960: p. 95] 'Pegasus' is a singular term despite having no referent. Also some singular terms may in fact have more than one referent, for example, 'the senator of Nebraska'. On the other hand, there are also puzzle case general terms. 'Unicorn', is a general term according to Quine despite being true of nothing. There are also general terms which are true of only one thing, like 'natural satellite of the Earth'. According to the way I distinguish general and singular terms however, 'natural satellite of Earth' is singular (as there is exactly one object) and 'the senator of Nebraska' is general.

Considering that the purpose of this discussion is to distinguish vagueness from generality, it is perhaps preferable to concentrate upon the slightly different

meaning of 'generality' proposed above. No real violence is done to natural language by doing this, and it makes the localized discussion being engaged in here flow much more smoothly.

3. Open Texture.

In his paper "Verifiability", Friedrich Waismann [1951] coined the term 'open texture'. Open texture and vagueness are sometimes confused. The two features are distinct, though related. Waismann [1951: p. 120] claims,

> "Vagueness should be distinguished from open texture....Open texture,...is something like [the] possibility of vagueness."

That is to say, in Waismann's opinion, open texture is something like a necessary condition for vagueness. According to Waismann, most empirical concepts exhibit open texture. A term has an open texture if the definition of that term is not exhaustive, or defined with "absolute precision". Waismann is primarily concerned with the verifiability of empirical statements. He attributes the problems of verifying this kind of statement to the fact that most of them have an open texture. It is impossible to foresee every possible circumstance in which a particular statement may or may not be applicable. Definitions do not usually legislate for every eventuality.

Waismann illustrates the notion of open texture with a number of examples. First he describes a situation in which

something we have been calling a cat does something very uncatlike. If a putative cat suddenly grew to a very large size, or suddenly disappeared into thin air, would we still feel quite justified in calling that thing a cat?[13] In this kind of circumstance, according to Waismann, we would have difficulty in deciding whether or not the term 'cat' still applied to that thing. Another example which Waismann gives is a situation in which a substance has the appearance of gold, satisfies all the chemical tests for gold, and yet emits a previously unknown kind of radiation. Again there would be doubt over whether or not the term 'gold' would correctly apply to such an unusual substance, according to Waismann.[14]

The reason why some terms have open texture, according to Waismann, is that it may not be possible to know all the relevant tests to completely verify a particular statement. If all the relevant tests for the correct application of a particular term are not known, then that term will have an

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13 It appears that Waismann was not the only individual to be asking this kind of question at that time. Compare Waismann's example of the disappearing cat, with Wittgenstein's [1953: para. 80] example of the disappearing chair. A similar example featuring robot cats is described by Putnam [1970: p. 143].

14 When Henri Becquerel discovered that crystals of what he called 'radium' were put in proximity of a photographic plate, the plate became fogged. He concluded that he was the first person to observe phosphorescence in a metal. Becquerel's discovery is strictly analogous to Waismann's example of gold. This suggests that even if there is doubt about the applicability of a term in unusual circumstances, in practice, it can be resolved. This supports the position that Wittgenstein [1953: para. 81] holds on this kind of term.

open texture. Not all terms have an open texture, however. Waismann [1951: p. 123] believes that mathematical concepts have a closed texture.

Waismann [1951: p. 120] gives two features which he believes vague terms possess, but terms with open texture do not. Firstly, a vague term is "used in a fluctuating way". That is to say, the uses which are made of vague terms are not consistent. Waismann does not make it clear whether he believes that an individual's use of a vague term varies, or whether the "fluctuations" occur across the use of a term by a community of speakers. The former is a considerably more contentious claim than the latter. The examples of vague terms which Waismann cites are the words 'heap' and 'pink'.

The other feature which can be used to distinguish vague terms from terms which have an open texture is,

> "Vagueness can be remedied by giving more accurate rules, open texture cannot." Waismann, [1951: p.120].

It is not totally clear however, that vagueness really can easily be removed by specifying "more accurate rules". Take for example the term 'heap'. There are two problems which have to be overcome in order for more accurate rules of use to be formulated. Firstly, a means of generalising the iterated unit which the vague term applies to has to be found. The rule must not only be able to deal with heaps of sand or grain, it needs to be applicable to all heaps, (heaps of rubbish, heaps of clothes, etc). Secondly, there

is a problem which arises from our linguistic intuitions. The proposal that one unit (of sand, rubbish, etc.) can make the difference between a particular collection being a heap and not being a heap is simply implausible. On the other hand, it does seem to be plausible to the claim that it may be possible to specify necessary and sufficient conditions for a particular substance being 'gold', or a particular animal being a 'cat'. Provided these conditions are understood to be a prescriptive set of rules rather than a descriptive set of rules, it should always be possible to determine whether or not a term applies to a particular case.[15] This being so, it seems reasonable to conclude that Waismann is wrong about the second feature which distinguishes vague terms from those which only have open texture.

Nevertheless, there does seem to be a genuine distinction between terms which merely have an open texture, and those which are vague (this does not amount to the claim that open texture and vagueness are mutually exclusive). However, one of the differences between the two seems to be the exact opposite of what Waismann claims. It is the case that,

> "[When] We introduce a concept and limit it in <u>some</u> directions;...This suffices for our present needs, and we do not probe any farther. We tend to <u>overlook</u> the fact that there are always other directions in which the concept has not been defined." Waismann [1951: p. 120].

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15 For a brief account of the difference between prescriptive and descriptive rules, see Twining and Miers, [1976: pp. 48-49].

Suppose in some hypothetical, technologically more advanced future, an animal were to be found on another planet. Suppose also that this animal looked and behaved just like the kind of animal we now refer to using the term 'cat'. In this instance we might well doubt whether or not the term 'cat' should be applied to this beast. Provided that the necessary and sufficient conditions for the application of the term 'cat' are satisfied (these might be found, for example in a biology book), we would be within our rights to apply the term 'cat'. This does not deal with the mild intuitive unease we might have about applying the term in these circumstances however. We may wish to add an additional condition to the rules for the applicability of the term 'cat' to the effect that all cats are of terrestrial origin. This should be unproblematic if the conditions are understood as prescriptive rules, as it would just amount to a change in the rules. In such an instance we would be specifying an additional "direction" to the definition of the concept. A similar procedure however, is considerably less satisfactory in the case of vague terms. To suggest that an object can be a heap if and only if it consists of a precise number of units, piled one on top of the other, is just too implausible. There is something much more problematic about specifying more precisely the applicability conditions of a vague term, than there is about giving more precise applicability conditions for a term which is open textured. The reason for this is that,

adding conditions for the applicability of a vague term is not specifying a new "direction" for the definition, rather it is making an already existing direction more precise.[16] This is a genuine difference between vague terms and terms which have open texture. Thus, it seems reasonable to maintain that open textured terms and vague terms are distinct.

4. Epistemic Failure.

An expression may fail to have a determinate truth-value for reasons other than vagueness, or as a result of the other features of language outlined above. Even if an expression is quite clear and unambiguous, it may still be unknown whether or not a particular sentence is true or false when applied to a particular state of affairs. Consider the sentence,

> (xiv) There are two planets in the universe which support some form of life.[17]

Sentence (xiv) may be true or false, however at the current time its truth-value is unknown. The fact that we do not know whether (xiv) is true or false has nothing to do with the vagueness of any of the terms in the sentence, rather it results from an epistemic failure.

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16 This point may seem a little obtuse, it will become clearer when I discuss the vagueness of the term 'heap' below.

17 I am assuming here that there will be general agreement on what is to count as 'life'. I am also ignoring the trivial case of when there are human beings on the Moon in this example.

Sentence (xiv) bears some resemblance to a future contingent sentence, like,

(xv) There will be a sea battle tomorrow.

in so much as there will be some point in the future, when the truth or falsity will be known. Sentence (xiv) differs from (xv) however, as we know when we will know the truth-value of (xvi), but not when we know the truth (or falsity) of (xiv). It is also worthy of note that it is much more likely that the truth-value of (xiv) will become known if the sentence is true than if it is false.

This kind of epistemic failure need have nothing to do with the future however. We can run into similar problems with sentences about the past. Indeed, many sentences about the past are much less likely to be able to satisfy the epistemic conditions necessary for them to be assigned a truth-value. A sentence like,

(xvi) Confucius once rode upon an ox.

does have a definite truth-value, the trouble is we do not know what that value is. Furthermore, the truth or falsity of (xvi) cannot be known, unless new archaeological or literary evidence appears. This, however, has nothing to do with the vagueness of the terms used in (xvi).

Epistemic failure, causes truth-values to be unknown, (and in some cases unknowable). Sentences in the present tense may even suffer from epistemic failure. For example,

(xvii) This plank has a length of 2.94238 meters.[18]

The truth or falsity of (xvii) will only be ascertainable if one has access to measuring devices of sufficient accuracy, otherwise the truth-value of (xvii) will simply remain unknown. This state of affairs is different from the case where the uncertainty over the truth-value of an expression comes about because the expression contains vague terms. Expressions which have unknown truth-values because of epistemic failures are always (at least in principle) resolvable, given the correct equipment, circumstances and procedures.[19] Vague expressions cannot be resolved by any amount of additional information. The failure in the case of vague expressions is much deeper in nature.

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18 Note, a greatly simplified account of the epistemological status of statements is all that is required for the current purpose. For a much more sophisticated treatment see Salmon, [1988].

19 This claim requires some clarification. The sentence in (xvi) could be discovered to be true or false given the right circumstances, (e.g. the discovery of an authoritative account of Confucius riding an ox). There is always the possibility that new evidence may be discovered, this is the force of the 'in principle' here.

III

Some problems with the notion of vagueness.

In the literature on vagueness, it is all too often assumed by authors that an intuitive, pretheoretic notion of vagueness is adequate. Occasionally, the terms 'vague' and 'vagueness' are introduced and discussed, with only the slightest explanation.[1] Sometimes, explanations take the form of an appeal to an example of a vague expression, which the writer takes to be a paradigm case of a vague term.[2] Obviously, this is preferable to no explanation at all; however, this still leaves the notion of vagueness nebulous and unanalysed.

Consider for example, Kenton Machina's [1972] approach in his paper, "Vague Predicates". He takes the term 'imprecise' to be a synonym for the term 'vague'.[3] He then describes a situation which, he believes, highlights the vagueness of the term 'red'. He asks the reader to,

> "Imagine a colour chip of orange-red hue, emitting light of wavelength 6465 [Angstrom] (in the middle of the borderline region between clear reds and clear oranges) if you will, present in a normally lighted room under normal observation conditions." Machina, [1972: p. 225].

Given the artifact described above, there is a difficulty in determining whether or not the term 'red' correctly applies to the chip. By stressing this problem, Machina explains how

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1 See for example, Lycan, [1984: pp. 62-70].
2 Sorensen, in [1985], for example, seems to do this.
3 More will be said about the various putative synonyms of the terms 'vague' and 'vagueness' below.

he wishes vagueness (or more accurately, imprecision), to be understood.

> "Let S be the sentence, 'This chip is red,' referring to the colour chip in question. Is S true? False? These queries seem hard to answer with any certainty." Machina, [1972: p. 225].

Machina explains further by claiming that the sentence, S is non-bivalent. Beyond this Machina does not clarify his notion of vagueness/imprecision. This minimal explanation is pernicious for at least two reasons. Firstly, it leaves the scope of the conclusions Machina wishes to draw undetermined. It is far from unproblematic to claim that every individual's intuitive grasp of the notion under discussion is going to be similar to Machina's. Secondly, Machina's use of an undefined pretheoretic notion of vagueness leads him into confusion. He fails to distinguish two different kinds of vagueness, which have different features. His exemplar term, 'red', (which he uses throughout the paper), exhibits one type of vagueness. However, he talks of,

> "...the family resemblances which will come under consideration in this paper,...". Machina, [1972: p. 225, fn 3].

'Family resemblance' concepts exhibit a different kind of vagueness. I will offer a detailed taxonomy of vagueness below which will make this difference clearer. Nevertheless, the problem can be brought to light by the following (brief) consideration. The term 'red' can be used to generate a sorites type paradox, whilst 'family resemblance' concepts

cannot. In fact, Machina does use the term 'red' to generate this kind of paradox.

> "P1: Chip #1 is red.
>
> P2: Chip #2 is indistinguishable from Chip #1 in colour appearance.
>
> P3: If any chip c is indistinguishable from a red chip in colour appearance, c is a red chip.
>
> C: Chip #2 is red." Machina, [1972: p. 228].

Now, consider the family resemblance term 'game'.[4] Although the term 'game' is vague, there is no way that it can be used to generate a paradox analogous to the one above. What feature of games would be iterated to generate such a paradox? Sorites type paradoxes can only be generated with linear concepts. Whilst red is a linear notion, by and large family resemblance concepts are not.[5] These two different types of vagueness do have some features in common, but it is simply wrong to claim that what is true of one kind of vagueness is true of all the other types as well. This is just what Machina is in danger of doing, because of his use of a confused notion of vagueness.

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4 This is an apt example of a family resemblance term as it is the term with which Wittgenstein [1953: paras. 66 & 67], introduced the notion. However, my use of 'family resemblance' is not totally Wittgensteinian. I will say a little more on this point when I discuss this kind of vagueness in detail.

5 Some family resemblance concepts may be linear, but these cases are atypical. They would be instances where a term has more than one kind of vagueness, (see below). It might be objected that a sorites paradox can be generated by asking how many characteristics of a family resemblance concept an object must have in order to fall under that concept. This trick does not work for all family resemblance concepts however. I will argue this point in more detail below also.

Many other authors also make an appeal to the sorites when discussing or introducing their notion of vagueness.[6] Indeed, the sorites paradox is arguably the most commonly found feature in discussions of vagueness (and related notions). Supposedly, on the authority of Diogenes Laertius (II, 108), the sorites argument originates from Eubulides. Diogenes describes this argument thus,

> "It cannot be that if two are few, three is not so likewise, nor that if two or three are few, four is not so; and so on up to ten."[7]

Examples of authors who cash out their idea of what vagueness is in this way are legion. Black, for example, uses this approach. He formulates his version of the argument thus:

> "Every man whose height is four feet is short.
> Adding one tenth of an inch to a short man's height leaves him short.
> Every man who is shorter than some short man is short.
> Therefore,
>
> Every man is short." Black, [1963: p. 3].

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6 This is not to say that every author construes the sorites the same way. Sainsbury [1988: pp. 29-31] for example maintains that the sorites involves a repeated application of the rule modes ponens. Burns [1986: p. 492], on the other hand takes the sorites to be an instance of mathematical induction. These differences are not of great import here however, as my remarks apply to both interpretations.

7 Diogenes Laertius, [1950: VII, 82]. It is worth noting that this account does not appear under Diogenes' discussion of Eubulides. The passage quoted arises where Diogenes is describing the position of the Stoics in the chapter entitled "Zeno".

Haack notes that versions of the sorites are given by Russell, Dummett and Cargile.[8] Other examples of the sorites (or near variants) in the context of discussions of vagueness, can be found in the works of Ballmer and Pinkall, [1983: p. 1], Fine, [1975: p. 285], Sainsbury, [1988/89: p. 33], Sanford, [1975: pp. 29-30], Sorensen, [1985: p. 134], Todt, [1983: p. 213] and Wheeler, [1975: pp. 368-369].

All sorites arguments depend upon the gradual variation of some magnitude. The difficulties arise over what quantity of a particular magnitude an object must have in order to be correctly said to have a particular property. The extreme cases are straightforward, the problematic instances are those midway between the extremes. Arbitrary stipulation of a quantity of the magnitude is usually deemed inadequate. In Black's version of the sorites quoted above, the magnitude is the height of the individual in inches and the property is tallness. The difficulty is supposed to derive from the vagueness of the property term used to generate the argument. Hence, terms with which a sorites can be generated are thought to be good examples of vague terms. As noted above however, not all vague terms can be used to generate sorites paradoxes. Sainsbury notes that the least that is required is

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8 Haack, [1974: p. 113]. Note, Dummett's [1975] description of a sorites type paradox (which he calls 'Wang's paradox'), is the main characterisation that he offers of what he takes the term 'vague' to mean.

> "...a preliminary account of what it is for a predicate to be vague that does not trivially make all vague predicates sorites predicates." Sainsbury [1988/9: p. 34].

Thus, authors who introduce and explain their conception of vagueness merely by appealing to the sorites, fail to adequately characterise vagueness, at least according to Sainsbury.

Another technique used by authors to introduce and spell out their notion of vagueness is to appeal to the process of language acquisition. Quine does this when introducing the notion of vagueness in Word and Object. He initiates his discussion of vagueness thus,

> "Vagueness is a natural consequence of the basic mechanism of word learning. The penumbral objects of a vague term are the objects whose similarity to ones for which the verbal response has been rewarded is relatively slight. Or, the learning process being an implicit induction on the subject's part regarding society's usage, the penumbral cases are the cases for which that induction is most inconclusive for want of evidence." Quine [1960: p. 125].

Although this does offer a plausible explanation of why some of natural language is vague, it does not explain what vagueness actually is. It merely presupposes that vague terms have 'penumbral objects'. Such a story has only a minimal explanatory value, as it presupposes an understanding of the notion of vagueness. Without some kind of prior account of what vagueness is taken to be, it seems likely that the notion of vagueness being used will almost certainly be a pretheoretic notion. As such, the objections

outlined above will obtain. That is to say, there is a danger that different kinds of vagueness will be confused with one another, and the scope of the conception will be occult.

Quine is not alone in telling a tale about how vagueness comes about and taking it for an explanation of the notion. Under the heading of an "explication of vagueness", Kindt adopts a similar approach.

> "...the interpretation of a vague predicate like 'old' will be learned by perceiving situations in which this expression or its negation is unequivocally associated with some persons. In the case of primary language acquisition, the child will first learn that, e.g., his grandmother can be called 'old' whereas he himself must be designated by 'not old'. Later on the child's extensional interpretation of 'old' will be expanded to other clear cases of old/not old persons. This expansion, however, will not lead to a totally defined predicate." Kindt [1983: p. 362].

Kindt continues to note that this kind story fails to take into account the context dependence of interpretation. However, like Quine's account, this strategy may explain why there are vague terms, but fails to tell the reader what vagueness is. Thus, Kindt's "explication" is objectionable as a definition, for the same reasons that Quine's is.

One commonly finds writers explaining their notion of vagueness in terms of one of the synonyms of the term 'vague'. Machina for example, discusses "precise" and "imprecise" predicates. He takes the term 'imprecise predicates' to be equivalent to 'vague predicates'.

Obviously, terms which are ideal synonyms (be there any such things), for the term 'vague' are of little use in explicating what vagueness is.[9] For, if an ideal synonym were used to explain or define the notion of vagueness, the result would be a trivial tautology.[10] Nevertheless, non-ideal synonyms can be used to give the reader an idea of what the writer has in mind by the notion of vagueness.

There still remains a problem however. There is no consensus amongst authors of works on vagueness as to which terms are suitable non-ideal synonyms for the term 'vague'. Whilst Machina adopts the term 'imprecise', Black prefers to use the term 'loose' instead of 'vague' (applying to concepts) throughout his paper. He considers 'loose' to be preferable to 'vague' as the latter

> "...may be misleading and has pejorative implications..." Black [1963: p. 5].

Unfortunately Black does not explain exactly how the term 'vague concept' is misleading in a way that 'loose concept' is not. Dummett, [1969: pp. 277-278], on the other hand,

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9 By 'ideal synonym' I mean a term 'x' such that it can be used to replace the term 'vague' in any particular expression containing that term, without altering the truth-value of the expression. Furthermore, to properly qualify for the title 'ideal', the expression which results from the substitution of 'x' should have exactly the same set of implications as the original expression. For the current purpose I am ignoring the difficulties that opaque contexts give rise to. For a discussion of synonymity and opaque contexts, see Mates, [1950].

10 This, of course, raises the problems posed by Moore's paradox of analysis. A discussion of this would be out of place here. See, Pap, [1958] for a discussion of some of the ins and outs of this paradox.

opts to describe vague expressions as statements which are not definitely true or false. Margalit [1976: p. 211] also identifies a sense of the term 'vague' which is equivalent to "being indefinite". According to him however, there is a further sense of the term which is equivalent to "being indeterminate". Indeed, there is an abundant supply of terms which may stand as non-ideal synonyms for 'vague'. A quick reference to any word finder or thesaurus will throw up a whole host of candidates. In addition to the terms mentioned above, other plausible non-ideal synonyms for the term 'vague' might be 'borderline', 'fuzzy', 'inexact', 'unspecific', 'ill-defined', 'uncertain', or 'unclear', to name but a few. It is unfortunate that the rationale for choosing one synonym rather than another is seldom explained or justified. It leaves it unclear exactly which features of the alternate term are salient in illuminating the notion of vagueness.

Consider the sentence,

(i) The sump bolt is loose.

It would be very unnatural to say, instead of (i),

(ii) The sump bolt is vague.

There are some kinds of uses of the term 'loose' which would not be helpful in elucidating the notion of vagueness. This difference is not merely grammatical. Both (iii) and (iv) are acceptable as sentences, despite having the same structure as (i) and (ii).

(iii) The main thesis is loose.

(iv) The main thesis is vague.

This kind of problem also exists between other putative synonyms of the term vague. Sentences (v), (vi) and (vii) all seem perfectly natural, but what they convey seems to be rather different.

(v) The requirements are inexact.

(vi) The requirements are uncertain.

(vii) The requirements are vague.

Sentence (vi) has epistemological overtones which (v) and (vii) do not. This being the case, 'inexact' would seem to be a better synonym for the term 'vague' than 'uncertain'. As has been argued above, vagueness should be distinguished from, and not confused with, epistemological failure. However, this does not mean that 'exact' is an adequate synonym either. 'Inexact' implies that a definite value can be given, and that the one proposed only misses the exact value by a small amount. By contrast, 'vague' implies that there is no exact value possible. The utterer of (viii) would be being inexact, whilst someone saying (ix) would be being vague.

(viii) This plank is between nine and ten feet long.

(ix) This plank is fairly long.

Explanations of the notion of vagueness which rely solely upon the reader's understanding of a term which is

supposedly a near synonym of the term 'vague' will not be adequate. Adequacy can only be achieved if it is made clear exactly which features of the putatively synonymous term are considered to be important. Furthermore, authors who explain their notion of vagueness by appealing to a synonym owe the reader a further explanation of why that particular synonym is to be preferred over other contenders. Unfortunately, these conditions of adequacy are seldom, if ever, met. The diversity of proposed synonyms for the term 'vague' seems to be a reflection of the lack of consensus, and general confusion which surrounds the notion of vagueness.

It is regrettable that so few writers follow Fine's example, and describe or define what they believe vagueness to be. Fine says on the very first page of his paper "Vagueness, Truth and Logic",

> "Let us say, in a preliminary way, what vagueness is. I take it to be a semantic notion. Very roughly, vagueness is deficiency of meaning." Fine [1975: p. 265].[11]

The scope of this definition is anything which is "capable of meaning". Even this preliminary definition is sufficient to differentiate vagueness from generality, undecidability, and ambiguity, according to Fine. However, this definition is not entirely unproblematic. As Fine, [1975: p. 266] notes, the definition is completely dependent upon a theory of meaning. Unfortunately, this dependency is sufficient to

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11 This definition is also cited by Eikmeyer and Rieser, [1983: p. 134].

make the definition multiply ambiguous, as the definition may have as many scopes as there are theories of meaning.

Essayists who offer a definition of the term 'vague' have to rely far less heavily upon some unspecified pretheoretic notion, than those who do not. Nevertheless, the various definitions which have been proposed do not all identify the same features as being fundamental to the notion of vagueness. It may be instructive to compare a few of the other proposed definitions at this point.

An intuition similar to Fine's seems to motivate the definition proposed by Bosch. Bosch defines vagueness thus,

> "...a concept is imprecise or (as we shall prefer) vague, if and only if it is not defined for each and every argument." Bosch [1983: p. 190].

There is an obvious similarity between this definition and the one Russell [1923: p. 89] proposed. Bosch claims that his definition derives from Frege's position on the semantic status of vagueness. Bosch [1983: p. 190] also adopts Frege's view that concepts are the referents of predicate-expressions, and serve as functions mapping things onto truth-values. However, this embracing of a Fregean position cannot be complete on Bosch's part. If he accepted a truly Fregean position, his definition would become useless. The reason this is the case is that according to Frege

> "...a concept that is not sharply defined is wrongly termed a concept." Frege [1970: p. 159].

So on a strictly Fregean reading of Bosch's definition, anything which might satisfy the definition would fail to fulfill the antecedent condition for the applicability of the definition, that is, would fail to be a concept. If Bosch's adoption of the Fregean position is only partial (as it seems must be the case), then he fails to explain how his position differs from Frege's, and thereby leaves it undetermined what exactly he takes a 'concept' to be.

Another definition of 'vague' is offered by C. S. Peirce, His understanding of the term turns upon indeterminacy of intention.

> "A proposition is vague when there are possible states of things concerning which it is intrinsically uncertain whether, had they been contemplated by the speaker, he would have regarded them as excluded or allowed by the proposition. By intrinsically uncertain we mean not uncertain in consequence of any ignorance of the interpreter, but because the speaker's habits of language were indeterminate; so that one day he would regard the proposition as excluding, another as admitting, those states of things." Peirce [1902: p. 748].

This definition is cited (slightly abridged and with additional emphasis) by Ballmer and Pinkal in their introduction. They maintain that this definition can be

> "...taken as an appropriate characterization of this concept, without modification." Ballmer and Pinkal [1983: p. 1].

Unfortunately, they fail to explain why they believe this to be the case, for there are reasons for finding this definition less than satisfactory. Firstly, the "intrinsic

uncertainty" of the speaker appears to be epistemic in origin. Peirce qualifies the above by continuing,

> "Yet this must be understood to have reference to what might be deduced from a perfect knowledge of his [i.e. the speaker's] state of mind; for it is precisely because these questions never did, or did not frequently, present themselves that this habit remained indeterminate." Peirce [1902: p. 748].

As was argued in an earlier chapter, epistemic failure must be distinguished from vagueness. It is in principle feasible that a speaker could ask the "questions" Peirce refers to, and thereby render his use of a particular proposition consistent with respect to "states of things". Given the distinction drawn earlier between epistemic failure and vagueness, Peirce's definition fails to distinguish between the two.

It seems that Peirce believes that vague propositions (to use his terminology) can be given a truth-value. The vagueness of a proposition simply amounts to the fact that truth-values are not attributed consistently to that proposition with respect to identical states of affairs. That is to say, Peirce's definition of vagueness is primarily pragmatic rather than semantic. This must be the reading that Peirce intends, given the explication of 'intrinsic uncertainty' found in the second sentence of the definition, and his choice of the term 'proposition'. This is an unusual way of conceiving vagueness. Haack, [1974: p. 109] describes Peirce's conception of vagueness as

"...somewhat eccentric...". The oddity of Peirce's view can be seen by comparing his definition to that of Ballweg. This comparison will also serve to highlight the lack of consensus over what vagueness actually is. Ballweg's definition is not based on either concepts or propositions, but rather upon predicates. It runs thus:

> "...we will talk of a predicate being vague in the sense that there are individuals which do fall under the predicate, individuals which don't, and a third group of doubtful individuals, where you can neither clearly say that they do nor clearly say that they don't fall under the predicate." Ballweg [1983: p. 65].

The force of this definition seems to be different from that proposed by Peirce. Ballweg's definition is semantic rather than pragmatic. That is to say, Ballweg wishes to maintain that vague predicates cannot be assigned a truth-value for certain states of affairs. The difference between Ballweg's definition and Peirce's can be clearly seen by considering what happens when an individual is faced by a colour chip like the one Machina describes (see above). According to Peirce, if someone was presented with this colour chip, and asked whether or not it was red, that individual might either reply "yes" or "no". However, on subsequent presentations, the same individual may well give different responses. Ballweg's definition, on the other hand, predicts that in the same circumstances, the individual will not be able to give a simple yes/no answer. The person might refuse to answer the question, or tell the inquirer that she simply could not tell for certain. This being the case, it seems

that Ballweg's definition is much more compatible with our experience of this kind of situation. The point here though is that the two definitions are dissimilar in a significant way.

Ballweg's definition is typical of the kind most frequently given in the literature. It is significantly similar to Alston's for example. Alston maintains that,

> "A term is said to be vague if there are cases in which there is no definite answer as to whether the term applies." Alston, [1964: p. 84].

This type of definition acknowledges that there are cases where vague terms are applied in a manner which is unproblematic. For example, when the vague term 'tall' is used to describe a member of a professional basket ball team, the resultant expression will, in most cases at least, be true. Alternatively, when a pygmy, a dwarf or a midget is described as tall, the resultant expression will be false. However, these definitions depend on the fact that there are cases where things are not so straightforward. The term 'tall' being applied to a man of just under six foot might be an instance of this.

These problematic cases are often called "borderline cases". Consider Sainsbury's definition of example:

> "A vague word admits of borderline cases, cases of which the word is neither definitely true nor false." Sainsbury, [1988: p. 26].

Sorensen takes the very existence of borderline instances to be sufficient to justify the application of the term 'vague', according to the definition he offers. Amazingly, he also believes that all other theorists agree with him:

> "Everyone agrees that a predicate is vague if and only if it has a borderline case." Sorensen, [1988: p. 199].

These last four definitions all bear a certain resemblance to one another. As such, it seems reasonable to maintain that they represent a certain theoretic drift or trend. However, it is not the case that they can be considered equivalent, just because they attend to a similar feature common to vague items. For one thing, there is little consensus on what the primary 'bearer' of vagueness is. Sorensen and Ballweg talk of "predicates", whilst Sainsbury uses the term "words" and Alston prefers to discuss "terms". Furthermore, Peirce's definition is couched in terms of "propositions", whilst Bosch's is based upon the notion of "concepts". No doubt, all these items are related to one another in some way; however it is simply wrong to say they are all the same.

It is also worth noting at this point, that there are two issues which are seldom differentiated from one another in works about vagueness. Firstly, there is the question of the role of vagueness in simple subject-predicate sentences. The second issue is the role of vagueness in more logically

complex expressions.[12] Different considerations come into play in the two issues, and I believe that it is most useful to discuss them in isolation from one another. I am concentrating on the former here.

There is a further reason for judging all the above definitions to be in some sense inadequate. This reason is closely related to the objections raised above to Machina's views. As will become clear in the following chapter, vagueness has a fairly complex internal structure, and although the definitions described above may be of some use in deciding when a particular term has the property of vagueness, we shall see that none of them can stand as an adequate characterisation of what vagueness is.

I hope that the preceding discussion has made it clear that vagueness, as discussed in the literature on the subject, is largely a pretheoretic notion. There is no consensus as to exactly what it is, and the various authors on the subject all too often fail to specify in an adequate manner what they take it to be. Moreover, it seems clear that the conception of vagueness employed by one writer has features which not shared by the conception used by another. This being the case, what is required is a detailed taxonomy of vagueness, in order to reveal some of the internal structure of the concept. Only when this has been accomplished, can

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12 This second issue is generally what is under consideration in discussions of vagueness which deal with many valued logics and supervaluation.

the project of sorting out the so called 'problem(s) of vagueness' be feasibly undertaken.

IV

What Vagueness Is.

Having shown that much of the literature on vagueness is based upon notions of vagueness which are inadequate, an attempt shall now be made to clarify what vagueness really is, in some detail. In the literature on vagueness, there does seem to be some degree of consensus that borderline cases are significant for determining whether or not a particular expression is vague. A borderline case is a case where the application of a particular expression to a particular object ('object' here is construed broadly), does not yield a string with a definite truth-value. A particular expression, e, is vague if it is possible that e gives rise to a borderline case. The modality is important here. Vague expressions do not necessarily give rise to borderline cases. Take, for example, the incontrovertibly vague term 'red'. It may play a role in a sentence like (i),

(i) Red is a colour.

(i) will not have any borderline cases; it is not vague. However, there are sentences where the term 'red' does give rise to borderline cases (see for example, Machina's example discussed in the previous chapter). This point is important as some writers on the topic of vagueness assume that vagueness is always infectious.[1] That is to say, if a particular sentence contains any vague expressions, then

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1 See for example Russell [1923].

that sentence is automatically rendered vague itself. Cases like (i) above, clearly show that this is not the case.

The above criterion, that vague expressions admit the possibility of borderline cases, might be thought of as sufficient to determine the 'genus' of vagueness. However, vagueness also has a number of sub-types, as I will argue below. These sub-types, or kinds of vagueness, should not be thought of as 'species', as strictly speaking, species are mutually exclusive. A particular vague expression may in fact exhibit more than one kind of vagueness. Again, more will be said about this below.

The first consideration is to ask what the vehicle of vagueness is. What 'bears' vagueness? The literature on vagueness, shows particularly little consensus on this question.

1. The Vehicle of Vagueness.

1.1. Objects.

It has been proposed that some of natural language is vague simply because some of the objects in the world are vague. The vagueness of these objects is then supposed to be reflected in the vagueness of the language concerning those objects. Michael Tye [1990], for example wishes to maintain that this is the case.[2] He gives the example of Mount

2 For further discussion of this position also see van Inwagen [1988].

Everest, which he believes to be a vague object. His claim is that,

> "It seems obvious that there is no line which sharply divides the matter composing Everest from the matter outside it." Tye, [1990: p. 1].

Parsons [1988] argues for a fundamentally similar position. He says,

> "I take it that it may be neither true nor false (and is thus indefinite)...whether a virus is alive, and whether the pile of trash that you swerved around yesterday is the very pile that is by the roadside today. The view that I am exploring is that these questions lack answers because of a genuine indefiniteness in the world, and not just because of a vagueness in our language." Parsons, [1988: p. 4].

The view that there are vague objects, historically, has come in for considerable criticism. It is commonly claimed that this view is an instance of the "verbalist fallacy". That is, confusing the properties of a linguistic representation with the properties of the things in the world that the items in the linguistic representation stand for. This is the critique of the position offered by Russell. Russell claims that,

> "There is a certain tendency in those who have realised that words are vague to infer that things are also vague....[However,] Vagueness and precision alike are characteristics which can only belong to a representation. They have to do with the relation between a representation and that which it represents." Russell, [1923: pp. 85-86].

Margalit [1976: p. 213] also criticizes this view on similar grounds. The vague-objects-in-the-world thesis has been further criticized on logical grounds, by Evans [1978]. He

argues that the idea leads to inconsistent identity statements. More recently the proposal that there are vague objects has been argued against by Pelletier [1989]. Again, the argument is made on logical grounds. Pelletier concludes that,

> "...no standard logic, not even a standard many-valued logic, can admit vague objects, if that is taken...to include the possibility of making vague identity statements, under pain of explicit, two-valued contradiction." Pelletier [1989: p. 492].

These arguments mitigate against the plausibility of the thesis that there are vague-objects-in-the-world. Hence, I will consider this suggestion no further.[3]

1.2. Concepts.

A more plausible thesis is that the primary source of vagueness is the vagueness of our concepts or ideas. That is to say, our mental representations of things are the source of vagueness.[4] This view seems to be broadly supported by the accounts of how vagueness arises in the process of language acquisition offered by Quine [1960: p. 125] and Kindt [1983: p. 362]. If it is the case that language is

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3 It may be the case that certain quantum facts are such that they seem to support the vague-objects-in-the-world thesis. However, my main concern here is natural language. The language used to discuss quantum facts is, to say the least, a highly specialised dialect of natural language. As such, I shall not consider objections raised on these grounds.

4 I do not wish to join in the debate over what exactly a mental representation is, nor argue a particular line on how mental representations are constituted. To do so would involve straying too far from the current topic. As far as I am aware, my remarks here apply to all theories of mental representation.

learned in a piecemeal fashion, then there is no reason to believe that positive reinforcement is given in a consistent manner, and so vagueness could be explained as arising due to the individual experiences which make up the concept not being consistent with one another. Further reasons for believing that concepts are the primary bearers of vagueness comes from the empirical studies of categorisation done by Rosch, and other cognitive psychologists.[5] Lakoff [1987: p. 42] remarks, when summarising Rosch's work on categorisation that,

> "Wittgenstein had speculated that categories were structured by what he called 'family resemblances'. Rosch showed that what philosophers took as a matter of a priori speculation could be demonstrated empirically."

Indeed, in his study of categorisation, Lakoff specifically identifies two types of categories which directly correspond to two of the types of vagueness that I will identify below. This supports the thesis that vagueness and concepts are closely related.

> "Conceptual systems are organised in terms of categories, and most if not all our thought involves those categories." Lakoff, [1987: p. xvii].

That is to say, if at one level of mental representation vagueness of the representation can be shown to occur, then there are reasons to believe that vagueness may also occur at other levels as well. If vagueness basically derives from

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5 For a discussion of a variety of these, see Lakoff, [1987: pp. 12-57, passim].

concepts, then one would expect to find that certain concepts have features similar to the types of vagueness. One kind of vagueness I have already mentioned in an earlier chapter is family resemblance vagueness. Radial categories exhibit family resemblance, according to Lakoff [1987: pp. 435 & 378]. Lakoff [1987: p. 153.] says of radial categories;

> "The most radical prototype phenomena are radial categories. They cannot be represented by single model plus general principles. They involve many models organised around a center, with links to the center."

'Prototype phenomena' are seen in categories which have asymmetries among category members. This kind of phenomena often shows up in the way goodness-of-example judgements are made. That is to say, radial categories will have a central prototype which may be understood as a paradigm case for that category. Other category members may more or less resemble the prototype. Lakoff [1987: p. 91] describes the relationship between non-central members of a radial categories and the prototype for the category as follows;

> "These variants [i.e. non-central members] are not generated from the central category by general rules; instead, they are extended by convention and must be learned one by one. But the extensions are by no means random. The central model determines the possibilities for extensions, together with the possible relations between the central model and the extension models."

Another type of category which Lakoff identifies is graded categories. Graded categories are significantly similar to

sorites vagueness. Lakoff [1987: p. 56] summarises his understanding of what graded categories are as follow;

> "Some categories, like tall man or red, are graded; that is, they have inherent degrees of membership, fuzzy boundaries, and central members whose degree of membership (on a scale from zero to one) is one."

Obviously, 'tall man' and 'red' can both easily be used to generate sorites type paradoxes.[6]

There are difficulties associated with maintaining that concepts are the primary bearers of vagueness however. Firstly, there is the question of how we are to utilise the notion of a concept in a definition of vagueness. Concepts, not being directly observable items, are difficult to individuate from one another. A more easily identifiable unit would be preferable, if one can be found. Secondly, talk of concepts seems to be dependant upon the use of language. We use particular words and terms to identify concepts. Whether or not we can form concepts for which we have no terms for, is a decidedly contentious issue. However, it is uncontroversial to claim that knowing the meaning of a word or term is to have a certain idea or concept associated with that term. The exact relationship between terms and concepts need not be of concern here. Even if concepts are the original bearers of vagueness, the most straightforward way of identifying and individuating them is

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6 C.f. Black's sorites generated using 'short', in Black, [1973: p. 3]. See also Machina's [1972: p. 228] sorites generated using 'red'.

via language. This being the case, there seem to be good reasons to take some variety of linguistic entity as the primary vehicle of vagueness.

1.3. Linguistic entities.

There are a number of linguistic entities which could, plausibly, be candidates for the primary bearers of vagueness. Sentences, words, terms and predicates are all possibilities. Propositions also most naturally fall under this heading. Peirce, it seems from his definition, believed the main vehicle of vagueness to be propositions. This is a view which must be rejected however. One of the significant features of propositions is that they are truth-bearing.[7] It is far from clear that this is the case with linguistic entities which are vague. Indeed, vagueness is often cited as a reason for rejecting bivalence, (i.e. suggesting that there must be more than two truth-values).[8] If propositions are understood as bearing truth only in a classical, bivalent sense, then the suggestion that 'propositions' are the primary bearer of vagueness will be objectionable. To consider propositions to be the primary bearers of vagueness, also simply begs the question against those who wish to maintain that the phenomenon of vagueness constitutes a failure of bivalence, (i.e. that vagueness

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7 Haack [1974: p. 82], says, "...the predicates 'true' and 'false' can...only be significantly applied to (tenseless) propositions.". A similar position is not incompatible with what Cartwright [1966] argues. See also, Copi [1978: p 6].
8 See Machina [1972] for example.

gives rise to truth-value gaps).[9] If propositions are always truth-bearing, then they cannot support truth-value gaps. The observations made earlier about the distinction between epistemic failure and vagueness prevent any defense of this proposal on epistemic grounds. That is to say, to claim that vague sentences are really bivalent, although we do not know what there truth-value is in certain cases, simply will not do.

Sentences can be vague. However, they are not the primary bearers of vagueness, as their vagueness is derivative. The vagueness of a sentence comes from the vagueness of the words which make up the sentence. Consider the non-vague sentence,

(ii) This person is male.

Another sentence of the same structure (although different meaning) can be vague. All that is required to make the second sentence vague is the inclusion of a vague word. Compare (iii) to (ii),

(iii) This person is bald.

There are a class of individuals of which (ii) is true, and another of which it is false. The same is the case with (iii), however with (iii) there will also be a class of individuals where it is neither straightforwardly the case that (iii) is true, nor that it is false.

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9 This more moderate position is held by Haack [1974: p. 124], for example.

Another reason for rejecting the proposal that sentences are the primary bearers of vagueness is that there exist smaller grammatical units which are vague. For example, noun phrases can be vague. Earlier, (iv) was given as an example of a vague noun phrase:

(iv) Institutions in financial difficulties

An attractive proposal is that the primary vehicles of vagueness are individual words. This is suggested by Sainsbury's [1988: p. 26] definition of vagueness.[10] The idea that words are the primary bearers of vagueness avoids the difficulties mentioned above with the proposal that sentences or propositions perform this function. Moreover, it is often the case that the examples discussed in the literature focus upon the putative vagueness of single words. The words 'heap', 'bald', and 'game', all exhibit the kind of features which we are inclined to associate with vagueness. This is the case even according to an intuitive, pretheoretic notion of what vagueness is. A further advantage with this proposal is that it makes possible the identification of the vague component(s) in larger grammatical units. The vagueness of sentence (v) (assuming Bill to be, say, a little under six feet in height, - i.e. a problematic case of 'tall') can easily be attributed to the term 'tall'.

(v) Bill is tall.

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10 This definition is quoted in the previous chapter.

The name 'Bill' may have a number of possible bearers, but it is not vague. Anyhow, we can quite easily imagine a situation in which it is quite definite who the name 'Bill' refers to. The 'is' in (v) is performing its familiar role as copula, ascribing some state or quality to the subject. As such, it does not contribute to the vagueness of (v). Thus the vagueness of (v) must arise from the vagueness of the term 'tall'.

Ascribing vagueness to individual words also helps to explain how the deletion of a single word may transform a vague sentence into a precise one. (For example, if the term 'almost' is removed from (vi*) below, the result is (vi). Whilst (vi*) is vague, (vi) is not). This is often the case when the vagueness of a sentence arises due to the inclusion of a 'hedge' word. Lakoff defines 'hedges' thus,

> "...words whose meanings implicitly involves fuzziness - words whose job is to make things fuzzier or less fuzzy. I will refer to such words as 'hedges'." Lakoff, [1973: p. 471].[11]

Also, the inclusion of a hedge term in a sentence can change a precise sentence into a vague one. Consider (vi), which is precise,

(vi) The angle is a right-angle.

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11 Note, Lakoff has changed his position on a number of matters which he deals with in this paper. See Lakoff, [1987: pp.122-123 & 138-139]. A discussion of the words, 'few', 'many', 'most' and 'approximately', which are used as hedging terms can also be found in Blau, [1983: pp. 108-121].

The hedge term 'almost' can be introduced into (vi), and the resulting sentence, (vi*) will be vague. (How many degrees, minutes or seconds must the angle be away from a right-angle to count as being 'almost' a right-angle?)

(vi*) The angle is almost a right-angle.

This being the case there seem to be good reasons for supposing that the primary bearers of vagueness are single words. However, there is one final difficulty which suggests that this proposal may require one slight further modification. Sometimes vagueness arises in sentences, not because of the inclusion of a single vague word, but because of the inclusion of a string of several words which together have the effect of making the sentence vague. In these cases, it is not always possible to ascribe the vagueness to one individual word of the string. The clearest, least controversial examples of this occur with hedges. Indeed, many hedges are made up of more than one word. Consider, for example, the following hedges; '...sort of...', '...can be viewed as...', '...for the most part...' and '...more or less...'.[12] This seems to suggest that the primary vehicle of vagueness is not just single words.

This is an apposite point at which to to mention an important distinction. Vagueness may enter a particular sentence in one of two ways, either through the inclusion of

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12 These examples come from the list of hedges which Lakoff [1973: p. 472] proposes. This list is by no means exhaustive.

an expression which is vague 'in-itself', or through the inclusion of a 'vagueness generator'.[13] Terms which are vague 'in-themselves', like 'red', 'heap' etc., actually have the property of vagueness inherent in them. That is to say, they have extensions which are not precisely determined for every case, and therefore have borderline cases. 'Vagueness generators' are expressions which have no extension of their own. They introduce vagueness by modifying expressions which do have extensions. Hedge terms are vagueness generators. Both those expressions which are vague in-themselves, and those which are vagueness generators are bearers of vagueness in the sense under discussion here.

The fact that many vagueness generators consist of more than just individual words, suggests that, rather than individual words being the primary bearers of vagueness, instead individual terms are.[14] An individual word can be correctly described as a 'term', but so can a string of words. There is no problem with saying,

(vii) '...can be viewed as...' is a hedge term.

This proposal avoids the difficulty described above. Regrettably though, the use of the word 'terms' for the primary bearer of vagueness may well produce some confusion. This is because Montague restricted the use of 'term' to the

13 Professor Matthen suggested this terminology.
14 Alston [1964: p. 84] seems to suggest that 'terms' are suitable as the primary bearers of vagueness when giving his definition.

kind of phrase which can be the (complete) subject of a sentence.[15] There are parts of language which act as bearers of vagueness, but cannot easily be subjects of sentences. Hedges (i.e. vagueness generators), for example, cannot be grammatically used as subjects of sentences (although of course they can be mentioned). 'Term' as it is usually construed also seems to be inapplicable to certain suffixes which can change a precise term into a vague one. That is to say, suffixes may bear vagueness when they act as vagueness generators. Consider the sentence

(viii) The box is square.

Assuming (viii) is uttered in the right kind of context, (viii) is precise. It ascribes a precise geometric shape to a particular box. The suffix, '-ish' can be added to 'square', this has the effect of making the sentence vague. A vague version of (viii) is (viii*),

(viii*) The box is square-ish.

Notice how the effect of adding the suffix '-ish' is very similar to the effect of adding the hedge term '...sort of...' as in (viii**).

(viii**) The box is sort of square.

The existence of suffixes which convey vagueness gives a further reason for rejecting the idea that the primary bearers of vagueness are individual words. The most

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15 See Pelletier and Schubert, [1988: p. 396, fn 1].

plausible thing for the primary bearers of vagueness to be is 'expressions'. The reason for this is that

> "...an expression can be any word, group of words, or other (perhaps smaller) meaningful unit of any syntactic category." Pelletier & Schubert, [1988: p. 396, fn 1].

I propose to follow the use of "expression" intended by Pelletier and Schubert. It seems that expressions are the most suitable candidates for the primary vehicles of vagueness.

2. Semantics/Pragmatics.

At this point it is worth introducing the distinction between semantics and pragmatics, as this distinction will be of use in removing some of the confusion which surrounds the notion of vagueness. Some philosophers, particularly 'ordinary language' philosophers, deny that the distinction between semantics and pragmatics can be justified. According to this view, the difficulties which vagueness gives rise to have their origin, not in the meaning of an expression, but rather in whether or not an expression is assertable in certain circumstances. However, as most of the literature on vagueness concentrates upon a semantic notion of vagueness, it seems most appropriate to do likewise. Thus, I assume a traditional position on the semantic/pragmatic distinction. It may be the case that an ordinary language approach to vagueness may yield useful insights, however, this would be a different project from the one being pursued here.

In traditional philosophy of language it is common to distinguish three areas: semantics, syntax and pragmatics. According to Lyons [1977: p. 114] this classification has its origin in the work of Peirce. However, it is more usually associated with Morris' work [1938] on semiotics. Morris gave early and late definitions of both semantics and pragmatics. His early definitions went as follows,

> "Semantics deals with the relation of signs to their designata and so to the objects which they may or do denote." Morris [1938: p. 35].
>
> "By 'pragmatics' is designated the science of the relation of signs to interpreters." Morris [1938: p. 43].

Later, he revised his definitions, so as to make them more precise. To a certain extent, these revisions were motivated by Carnap's use of the terms, which Morris believed to be too restrictive.[16] Morris' later definitions were,

> "...pragmatics is that portion of a semiotic which deals with the origin, uses, and effects of signs within the behavior in which they occur; semantics deals with the signification of signs in all modes of signifying..." Morris, [1946: p. 219].

As Lyons [1977: pp. 115-117] notes, the current understanding of the distinction is basically the result of the development of it by Morris, Carnap and Bar-Hillel.[17] Nevertheless, it is also the case that the distinction is, in many respects, still controversial [Lyons, 1977: p. 117].

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16 See Lyons [1977: pp. 115-117], for an account of Carnap's position, and how it was objectionable to Morris.
17 For references to the relevant works of these three authors, see Lyons [1977].

Indeed, Kempson [1975: p. 3] notes that the two sides of this dichotomy are often conflated, (at least by linguists).

The understanding of the semantic/pragmatic distinction which will be employed below, is roughly that which Martinich [1985: p. 4] suggests: Semantics is the study of meanings. Words, terms, phrases, sentences, etc., can all have meanings in this sense. The notions of truth and reference are of considerable importance in the context of semantics.[18] One primary focus of semantics is to consider the relation between signs and the things which they designate or represent. Pragmatics, on the other hand, is far more concerned with the way that speakers of a language use their language. Kempson [1975: p. 138] describes a pragmatic theory as a theory which explains how a language is used to enable any speaker to communicate with any hearer. There are a whole range of things which are not conveyed merely by the meanings of the words used when we engage in communication. (Consider, for example, what Grice [1975] calls conversational implicatures). Any particular utterence will be affected by a whole range of factors in addition to the meanings of the words employed in the utterence. It is the meaning(s) alone which are part of semantics. Considerations like the influence of context will fall under the head of pragmatics. This is not to say that all semantic considerations are entirely distinct from

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18 Note, this is not proposed as a full definition of semantics. Rather, the purpose here is to indicate what is significant for the current context.

pragmatic influence; indexicals are a reasonable, though not uncontroversial, example of linguistic entities in which both semantic and pragmatic features combine.

2.1. Pragmatics.

Despite the roughness of the pragmatic/semantic distinction, it can still be usefully employed. In particular, in the context of vagueness, it can be asked whether or not the vagueness of a particular term is something which is an inherent feature of the term itself, or whether it is merely something which comes about from the use of the term by speakers of a language. The former might be called 'semantic vagueness' and the latter could be dubbed 'pragmatic vagueness'. The semantic vagueness of a particular expression is vagueness which comes about irrespective of the context of utterence. The pragmatic vagueness of an expression, on the other hand, is intimately connected with the context of utterence.[19]

Hempel [1939] discusses vagueness and the pragmatic/semantic distinction. He describes his understanding of the distinction in terms of an analogy with a game of chess. He sees the pragmatic (or 'behavioristic', in his own terminology) aspects of language, as basically an empirical phenomenon. The result of studying the use of a language is a series of empirical statements which are,

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19 C.f. Grice's [1975] distinction between meaning and implicatures.

> "...comparable with the description which an observer who does not know the rules of chess might give of the behavior of people playing chess." Hempel [1939: p. 172].

That is to say, the description of the game would include features which were both essential and inessential to the game. The semantics of a particular language is part of a theoretical linguistic system, according to Hempel's view. This system is generated by abstracting from empirical data describing the use of the language. The rules of syntax and semantics of such a theoretical linguistic system are precise. In terms of the chess analogy, semantic rules correspond to the rules of chess. Obviously, the rules of chess are important to a game of chess, and they too are precise. Pragmatic features, however, are inessential. It makes no difference to a game of chess whether or not players make their moves with thoughtful frowns upon their faces. Likewise, according to Hempel's view, the psychological effects (i.e. pragmatic features) which accompany a particular expression's use are irrelevant to the meaning of the expression. Hempel [1939: p. 176] believes that vagueness is merely a pragmatic phenomena.

Margalit [1976: pp. 213-214], points out that this view must, to some extent at least, be incorrect. The vagueness of the language employed by speakers would make the process of 'abstraction' extremely difficult and complicated. Rather than vagueness being equivalent to the thoughtful frown of a chess player, it is more like a sloppy player who places his

pieces on the lines between the squares. Hempel describes the process of abstraction thus,

> "In abstracting...a theoretical linguistic system from the empirical data obtained in the behavioristic study of a language, one has to omit any reference to the users of the language, to their psychological reactions connected with the use of the terms, etc.; in other words, one has to disregard...the pragmatic rules of the language." Hempel, [1939: p. 172].

This view suffers from a number of shortcomings. Firstly, Hempel needs to explain how such a process of abstraction is going to handle indexicals. Secondly, Hempel's example of an empirical description of the use of a language, is based upon the language of a "newly discovered tribe in Borneo". He describes the language as being

> "...examined as an empirical phenomenon, namely as part of the total behavior of its users. An investigation of this type would aim at determining the different expressions of the language and the modes of combination; further, the subject matter which they serve to refer to, [and] the conditions under which they are employed,..." Hempel [1939: p. 172].

Quine [1960] has pointed out the pit-falls and difficulties which can arise when trying to attempt such a radical translation. Hempel needs to explain why abstraction should give rise to one favored linguistic system rather than a plethora of plausible systems. It seems reasonable to conclude from the description of abstraction above, that the "empirical data" derived from the use of the language will include some representation of vagueness within it. Thus, vagueness must be removed in the process of abstracting from

the data. Hempel fails to describe in sufficient detail exactly how this is done however. This is just the crux of the matter though. How is it that precise rules can be generated from imprecise data, in a non-arbitrary way? This kind of problem has to be faced whenever something precise is generated on the basis of something imprecise.

Consider the case of a red rectangle on a white background. Suppose also that the edges of the rectangle are blurred so they merge with the white background at the extremities, without any noticeable break. If one were asked to draw a precise outline of the rectangle, how would one proceed? This is a set of circumstances which Wittgenstein considers. He remarks,

> "Of course - several such sharply defined rectangles can be drawn to correspond with one indefinite one. - But if the colours in the original merge without a hint of any outline won't it become a hopeless task to draw a sharp picture corresponding to the blurred one?" Wittgenstein [1953: para. 77].

This kind of situation seems to be similar to that which Hempel describes. Given the empirical data with all its vagueness, what good reasons can be given for preferring one set of precise, abstracted rules over another?

Hempel also gives no reason to believe that the abstracted rules will themselves be precise, (even assuming a particular favoured set can be found and the choice justified). Rather, he merely assumes that this must be the case.

> "If the semantics of a language is determined by means of a relation of designation which admits of degrees, that language cannot be translated into English." Hempel [1939: p. 175].

This in effect is just to claim that the underlying logic of the semantics of English is classical. This claim is really quite astonishing, and is far from uncontroversial. It certainly requires more justification than Hempel supplies. Hempel can only be justified in maintaining that vagueness is only a pragmatic feature of language if this claim, as well as his views upon abstraction are entirely correct. As noted above however, Hempel's account of abstraction is far from problem free.

So, Hempel's reasons for claiming that vagueness is a feature only of the use of terms in a language (i.e. the pragmatics) are inadequate. Thus, there is no good reason to accept his conclusion. It is plausible to maintain that vagueness can be a feature of both expressions, and the use that is made of them.[20]

There are some features of vague terms which are only salient in the context of use. One example of this kind of feature, might be what I shall call 'appropriate vagueness'. Consider, for example, a situation in which someone says,

(ix) Peter was late.

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20 This conclusion is also argued for, albeit rather weakly, by Austin [1962: pp. 126-127].

'Late' is vague here. Suppose (ix) was said to someone in the context of a discussion about a dinner party. Chances are, Peter would not be thought of as being late if he showed up thirty seconds after the appointed time. Perhaps even if Peter had arrived as much as five minutes after he was supposed to, he would not be considered as being late. Due to the vagueness of the term 'late' however, it is indeterminate how many minutes after the appointed time Peter would have to arrive in order to count as being late (i.e. to make (ix) true). Obviously, if Peter's arrival was four hours later than required, (ix) would definitely be true. On the other hand, suppose that Peter was a basson player and (ix) was said in a discussion about a particular orchestral rehearsal. In this case, if Peter had begun to play as little as half a second after the correct time, he would definitely count as being late. Indeed, lagging behind the beat at all, in a musical context would constitute being late. If (ix) was said to another individual who had been present at the orchestral rehearsal, there would be little doubt over the truth or falsity of (ix). Appropriate vagueness is when a sentence is vague in the abstract, but loses its vagueness because of the context in which it is used. Thus, appropriate vagueness is in some sense very closely connected to the context of the use of a term. This is something which falls into the scope of pragmatics rather than semantics. When language is used to communicate, it may

be permissible to be vague, without the truth of a particular utterance being in any doubt.

Context can play a role in the permissibility of vagueness in other ways too. If someone asks the weight of an object before lifting it, it would be quite alright for someone to respond by saying,

(x) "That box weighs about a hundred weight."[21]

This is the case even if the box in question actually weighed considerably less than a hundred weight. The response (x) would be adequate in the circumstances, even if the box only weighed ninety pounds. The person about to lift the box would still have a fair idea of what to expect when they attempted to pick up the box. Compare this to a situation in which someone is buying something (say, potatoes). A purchaser is likely to be quite annoyed if she is purchasing potatoes by weight, and enquires about the weight of a particular box and she received (x) as a reply from the vendor. The greater the difference (assuming it is a deficiency) between the weight of the box and a hundred weight the greater will be the purchasers irritation. The permissibility of vagueness in communication varies with context.

There are circumstances where the applicability of a particular term to a particular state of affairs may be

21 A hundred weight is an imperial measure equal to one hundred and sixteen imperial pounds (just over fifty kilograms).

crucial. When recalling a social event the vagueness of the term 'drunk' in (xi) may be of no consequence.

(xi) Peter was drunk.

Suppose someone was telling a friend about a party which occurred while they were out of town. This person might say sentence (xi) to her friend. Whether or not (xi) is true is of no great import in this circumstance. On the other hand, if on the night in question Peter had committed some heinous crime, it may be of crucial importance for determining culpability whether or not (xi) was true or false.

Although pragmatic vagueness is a topic of considerable interest, it will not be discussed in detail here. The literature on vagueness is mostly concerned with semantic vagueness.[22] It is the semantic difficulties which vagueness raises which will be pursued here. The greatest confusion in the literature concerns this type of vagueness, it is this kind which is most in need of clarification.

2.2. Semantics.

Semantics is the study of meaning. As this section will deal with semantics, its nature and content will be determined by the account of meaning employed.[23] It is commonly taken to

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22 See, for example, Fine's [1975: p. 265] definition of vagueness as "deficiency of meaning". In the previous sentence he describes vagueness as a "semantic notion".

23 There are numerous theories of meaning. Unfortunately, they all suffer from defects of various varieties. For a discussion of a number of linguistic-inspired theories of meaning and their shortcomings, see Fodor [1977: pp. 9-61, passim]. In what follows I shall employ only those features

be the case that meaning has both an intensional sense and an extensional sense.[24]

The extension of an expression is the object or set of objects which that term refers to.[25] So, for example, the extension of the term 'unicorn' is all the members of the set of unicorns. It just so happens in this instance that the set has no members; hence, the term 'unicorns' has the null set as its extension. The extension of the expression 'even natural number' is just all those numbers which are members of this set, i.e. {2,4,6,...}.

Sets may be specified, or named in one of two ways. Firstly,

> "Since...sets are determined by their members, it is natural to form names of sets out of names of their members." Thomason, [1970: p. 285].

If this method of naming a particular set is employed, and an expression refers to that set, then to list all the members of the set is to list all the things which are in the extension of that expression. So, for example, the extension of the expression 'planets orbiting the Sun', is all the objects named in (xii).

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of semantic theories which are commonly found in the literature on vagueness.

24 Fine [1975: p. 266] invokes this distinction. It is of explanatory value in the current discussion. Note, 'Sense' as used here is not meant to be the technical notion of sense.

25 It is hard to know what set should be ascribed to morphemes such as the suffix '-ish'. One possible way to interpret such terms is to consider them to be second order functions. A similar approach may well prove useful in handling extensionless hedge terms also.

(xii) {Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto}.

Not all sets can be specified using this method. Fairly obviously, it would be inappropriate to try to name very large sets using this technique. Furthermore, not all sets are finite. It would be, in principle, impossible to name an infinite set by naming each and every one of its members.

Fortunately, sets can also be specified by property. According to Thomason [1970: p.287], this is the most common method for specifying the sets which expressions in natural language apply to. The property or group of properties which can be used to specify the set that is named by an expression, x, constitutes the intension of x.[26] That is to say, the intension of an expression is the set of conditions such that, if any given object satisfies those conditions, then that object is in the extension of the expression. This being the case, an expression's intension picks out the set of objects in the expression's extension. So, intensions give the relation between expressions in a language and the things they represent. Meaning is generally taken to be intensional rather than extensional, as a purely extensional theory of meaning runs into significant difficulties.[27]

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26 Although this is a common use of the term 'intension', it is worth noting that 'intension' is a technical term which various theories use differently. The use I intend is the one described here.

27 See, for example, Quine, [1961: p. 27]. Quine also gives reasons for believing this to be the case here.

Firstly, consider the meaning of the term 'peach', it cannot just be peaches. One can eat peaches, but not meanings. One can learn meanings but not peaches. There are significant differences between objects and meanings, so to identify the two (with identity taken strictly), is untenable. Frege gave a famous example, which serves to illustrate another difficulty which arises with referential theories. Consider the two sentences

(xiii) The Morning Star is the Evening Star.

(xiv) The Morning Star is the Morning Star.

The terms, 'the Morning Star' and 'the Evening Star' have the same extension, i.e. the planet Venus. However, they do not mean the same thing. If 'the Morning Star' meant the same as 'the Evening Star', then (xiii) and (xiv) should be identical in meaning. In the normal sense of 'meaning', the sentences must mean something different because, (xiii) tells us something about heavenly bodies which is contingently true, whilst (xiv) is analytically true.[28]

Designating meaning in terms of intensions avoids this difficulty. The properties which intensionally specify the meaning of 'the Morning Star' include the property of being visible at around dawn. The properties which specify the meaning of 'the Evening Star', on the other hand, do not

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28 The term 'normal' here is supposed to distinguish it from the way Kripke understands 'meaning'. Kripke, amongst others, retracts this normal sense.

include the property of being visible at around dawn. Thus, meanings are taken to be intensions.

Fine [1975: p. 266], draws a distinction between intensional and extensional vagueness, according to which the former determines the possibility of the latter.

> "A predicate F is extensionally vague if it has borderline cases, intensionally vague if it could have borderline cases. Thus 'bald' is extensionally vague,...and remains intensionally vague in a world of hairy or hairless men." Fine [1975: p. 266].

A term is extensionally vague when it is indefinite whether a particular object should be included or excluded from the scope of the term. A term is intensionally vague when the scope of the term is indefinite. Fine is not the only author to notice this feature of vagueness, although other writers characterise it in slightly different ways. Quine [1960: p.126], for example, notes that,

> "Commonly a general term true of physical objects will be vague in two ways: as to the several boundaries of all its objects [intensional] and as to the inclusion or exclusion of marginal objects [extensional]."[29]

The purpose of noting this distinction is to make it clear that, given the relation between intensions and extensions (which is mirrored by the relation between intensional vagueness and extensional vagueness), it must be the case that the origin of vagueness lies in the intensions of terms.

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29 See, also Margalit, [1976: p. 211].

A word or two about truth are in order at this point. Not all expressions in natural language are uncontroversially considered to be truth bearing. Fodor [1977: p. 50], for example, notes that,

> "Imperative sentences, interrogative sentences, and even some sentences which are declarative in superficial form,...would seem to have little to do with the concept of truth."

This being the case, truth-conditions cannot be given for every expression in natural language. However, in the current context this difficulty can be avoided. Any term which is vague can play a role in a simple declarative expression. Thus, matters can be considerably simplified by just considering truth in relation to simple declarative expressions.[30] Another simplification can be achieved by considering only the subject-predicate form of sentences.[31]

Let F be some predicate of a natural language L, and let x be some expression of L which can serve as a subject for F. And let us suppose that F(x) then expresses the simple subject-predicate form mentioned above. Then, most linguistic semantic theories would express the truth conditions for F(x) as follows;

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30 The term 'simple' here indicates that I shall attempt to avoid the difficulties which can arise with declarative sentences in general, such as referential opacity and the like.

31 A result of this simplification is that the position I argue for, namely that vagueness is bourne by individual expressions, is clearest for nouns and noun-phrases. It may also work for complete sentences, although not nearly as straightforwardly.

(A) F(x) is true in L, if and only if the object denoted by x belongs to the set specified by F.

(B) F(x) is false in L, if and only if the object denoted by x does not belong to the set specified by F.

It might be objected that this specification of truth conditions is overly complicated. It perhaps might be proposed instead that (A) alone would be sufficient, if it was stipulated that in all other cases F(x) was false. That is,

(A^*) F(x) is true in L, if and only if the object denoted by x belong to the set specified by F. Otherwise F(x) is false in L.

However, the first formulation better reflects the way vague terms behave in natural language. For most vague expressions there are objects which are such that F(x) is clearly true. For example, if F is the predicate '...is tall', and x is an individual who's height is six foot seven inches, then F(x) is clearly true. That is to say, x is a member of the set of tall things, so by (A) in this case F(x) is true. On the other hand, it is also the case that for most vague expressions there are objects which are such that F(x) is clearly false. If F was predicate '...is tall' and x is an individual who's height is four feet one inch, then F(x) is clearly false. That is to say, x is not a member of the set of tall things, so by (B) in this case F(x) is false.

But now suppose that x was a borderline case of an F. Neither (A) nor (B) would unproblematically be applicable.

This would is commensurate with the intuition that in borderline cases it is in principle indeterminate whether or not F(x) is true or false. On the other hand, if the truth condition (A^*) was employed, then the borderline case would be judged false (due to the 'otherwise...' condition).

The preferability of taking truth-conditions as (A) and (B), rather than (A^*) can be seen when considering the following examples. Moreover, the following examples also illustrate the difficulties which arise over the applicability conditions of vague sentences. Suppose that F stands for the precise predicate '...is rectangular'. The conditions for an object being rectangular can easily be specified as follows; An object o is rectangular if and only if, o is planar, o has four straight sides, and the adjacent sides of o meet at right angles. Note, this is an intensional definition. F names the set of rectangular things. Suppose x is assigned the value 'The side of a cube'. Then by (A), F(x) will be true. That is to say, x is a member of the set specified by F. On the other hand, if x were assigned the value 'The cricket ball' then, by (B), F(x) would be false. That is to say, x is not a member of the set specified by F. In these examples, matters are quite clear. Truth and falsity would be the same in the two instances even if condition (A^*) had been used instead. This is typical of non-vague sentences, a non-vague sentence is simply one in which (A) and (B) can be reduced to (A^*). The differences in the two ways of

specifying truth conditions only become apparent when handling non-precise cases.[32]

Next consider the predicate F^*, which stands for the predicate '...is sort of rectangular', which names the set of things which are sort of rectangular. The inclusion of the vagueness generating hedge '...sort of...' makes F^* vague. Unlike F, the conditions for an object being sort of rectangular are hard to specify. It is unclear how exactly the conditions for an object o to be F^*, differ from the conditions for o to be F. Perhaps the requirement that the sides of o meet at right-angles would be relaxed to some degree. Alternatively, maybe the condition that the sides of o be straight would be dropped. Yet again, a number of the other conditions may be dropped or modified. Extra conditions may even be added. The set which the predicate F stands for is clearly determined. It has sharp boundaries. The set specified by F^*, however, is not clearly determined, and does not have sharp boundaries.

If x was assigned the value 'The province of Saskatchewan', then $F^*(x)$ would be true, by (A). On the other hand, if x was assigned the value 'The British Isles', by (B), $F^*(x)$ would be false. However, if x was assigned the value 'The province of Alberta', neither (A) nor (B) seem to be

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32 It is important to remember that although vagueness is not primarily bourne by sentences, sentences may nevertheless be vague. The vagueness of a particular sentence will be derivative from the vagueness of vague expressions which are parts of the sentence.

applicable. Without a clear idea of the conditions which must be satisfied for an object to fall under F^*, it is indefinite whether or not 'The province of Alberta' is a member of the set specified by F^*. In this last case, the truth or falsity of $F^*(x)$ would be uncertain. Now, if the truth condition (A^*) was employed instead of (A) and (B), things would be a little different. As before, if x was 'The province of Saskatchewan', then $F^*(x)$ would be true, and if x was 'The British Isles', then $F^*(x)$ would be false. However, in the final instance where x is 'The province of Alberta', rather than $F^*(x)$ being of indefinite truth value, it would be false. So, using truth conditions (A) and (B) permits truth-value gaps, whilst the condition (A^*) does not. This is of significance, as some authors (e.g. Fine [1975: p. 267]) maintain that one of the significant features of vagueness is that it is truth-value gap inducing.

From the above, it should be clear that vagueness can be either pragmatic or semantic, and that the latter kind of vagueness has its origin in the intension of a term. If the conditions for the applicability of a particular term are insufficiently specified, so that membership in the set that the term (or an otherwise precise expression containing that term) names is indefinite in some instances, then that term is vague. (Assuming truth-conditions are construed as suggested above). Vague terms fail to have a definite

(bivalent) truth-value in some instances, because of the indefiniteness of their applicability conditions.

3. Types of Vagueness.

The intension[33] of a term can be considered as the qualification(s) which an object[34] must satisfy in order to fall within the scope of that term. That is to say, if an object x satisfies the condition(s) for being an F, then x is an F. From (A) above, it also follows that F(x) is true, if the condition(s) are met. As vagueness has intensions as its origin, it is possible to distinguish different kinds of vagueness by the different ways that intensions can be specified.

The qualifications for x to be within the scope of F can be either simple or complex. The distinction between simple and complex conditions is important for differentiating types of vagueness.

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33 My purpose here is not to solve all the difficulties which are associated with notions of intension. For the purposes of the current exercise, the disagreements over intensions can be ignored, as what I argue does not presuppose any position on these. My position does however presuppose my remarks about intension made in the previous section.

34 Note, I am using the term 'object' here in a very loose, general way. I intend non-physical objects to fall within the scope of this usage. Roughly speaking, the scope of the current use of 'object' is anything which may be a grammatical subject of an expression. This permits emotions, ideas and so on, to fall under the current use of 'object' here. C.f. Robinson's [1954: pp. 30-31] broad use of the word 'thing'.

It seems reasonable to assume that qualification conditions are normally related to one another by conjunctions, unless otherwise stated. Adopting this convention should go some way to make the distinction between simple and complex qualification conditions clear, as well as to highlight the importance of this distinction for identifying types of vagueness.

It is also worth distinguishing between "normal conjunctions" and what I shall call "open conjunctions". A normal conjunctive expression is true just in case all its conjuncts are true, otherwise it is false. That is to say, a normal conjunction is just the standard conjunction of classical logic. Open conjunctions are considerably more problematic. The primary purpose of an open conjunction is to concatenate qualification conditions into a single inhtension. Open conjunctions are not truth preserving connectives. When the qualification conditions for a particular expression E, are related to one another by open conjunctions, if all the conjuncts are satisfied by a particular object o, then o will be a clear instance of a thing which is E. Likewise, if another object o^* satisfies none of the qualification conditions for E, then o^* will clearly not be an instance of a thing which is E. In both these cases matters are straightforward, regretably with open conjunctions, things are not always a simple. One of the unusual features of expressions (like E) which have qualification conditions which are related to one another by

open conjunctions is, that although not all the conjuncts are satisfied by a particular object, E may still apply to that object. That is to say, if it is unclear how many or which of the qualifying conditions must be satisfied for an object to be E, then the qualifying conditions for E are said to have the form of an open conjunction. Suppose that expression E, has four individual conditions which plausibly may be candidates for being part of the intension of E. It might be the case that a particular object, p, only satisfies two of the conditions for being E, although p is clearly a case of a thing which is E. (i.e. E(p) is definitely true). Open conjunctions are such that they may be true, although not all their conjuncts are satisfied. A little more will be said about open conjunctions when I discuss type II vagueness below.

A literal is either an atomic sentence or its negation. A qualification is either a literal or a disjunction of more than one literal, the former is a simple qualification and the latter is a complex qualification. The qualifications for x to be F is a conjunction of qualifications.[35] This is complex just in case one of the qualifications is complex.[36]

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35 It could be objected that the qualifications for a particular x to be F might all be inarticulable. Alternatively, it might be objected that the conditions used in the examples below are *insufficient*, or *are* not the only possible set of qualifications for the application of an F to an x. None of these objections are of too much concern here however, as the goal here is to show that the position I am arguing for is, in principle, feasible. Even if the examples used are defective in some way, others could be found.

36 I owe this formulation to FJP.

There are examples of terms which are precise (i.e. non-vague). Consider the familiar example of the term 'rectangle'.

> An object, o, is within the scope of the term 'rectangle', if and only if, (a) o is a plane, and (b) o has four straight sides, and (c) the sides of o meet at right-angles.

For an object to be correctly termed 'a rectangle', conditions (a)-(c) all have to be fulfilled. If o^* were to be a parallelogram or some other kind of quadralateral which failed to meet condition (c) then, o^* would not be a rectangle.

Below, using this kind of specification of intension, I will identify three different types of vagueness. The notion of 'specification' is important in fully understanding these three types. By 'specified' I mean formulated in an definite manner. If something is formulated in a definite manner, then it will always be clear whether or not any particular thing falls within or without the specification. This may give some appearance of circularity with respect to vagueness, as something which is inadequately specified will have problematic cases. This is not objectionable here however, as the point is to show that troublesome cases come about for different reasons.

Although in certain instances the three types of vagueness which I identify are quite distinct, some expressions have features of more than one type. For example, a particular

expression's qualifications may have the form of an open conjunction, and one of the conjuncts may be such that in certain circumstances it is unclear whether or not the condition has been satisfied. An expression which had both these features would fall under type I and type II vagueness, as defined presently, any expression which falls into at least one of these three types is vague.

The three types of vagueness are;

> Type I, ("Sorites Vagueness"). Type I vague expressions have either simple or complex qualifications for applicability, but at least one of the qualifications is not fully specified. As a result of this lack of adequate specification, there are cases where it is indefinite whether these conditions are satisfied. Furthermore, the problematic cases of qualification satisfaction cannot be remedied by more information about the particular object for which the expression is indefinite.
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> Type II, ("Family resemblance vagueness"). Type II vague expressions have complex qualification conditions. It is not specified how many conditions an object needs to satisfy in order to fall within the scope of the expression, nor are the relative importance of the conditions specified.
>
> TypeIII, ("Conflict Vagueness"). Expressions with this kind of vagueness have complex qualification conditions. However, in certain instances, the conditions may conflict with one another.[37]

This taxonomy of vagueness is only provisional. It may turn out to be the case that there are other types of vagueness as well. The distinctions between the different types of

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37 These three types of vagueness are based upon the three kinds that Haack [1974: p. 111] briefly specifies. There are reasons to believe that Haack's three-fold distinction has its origin in the work of Alston [1964: pp. 86-90].

vagueness may also be a little suspect. There may be grounds, for example, for maintaining that what I am calling type III vagueness is in reality just a special case of type II. I will address this particular difficulty below. One or more of these three types may also exhibit significant internal structure. Nevertheless, this preliminary description of three possible different types of vagueness should be sufficient to show that not all vagueness need be the same, and hence vagueness should not be treated as a unitary phenomenon. Furthermore, even if incomplete, these types may form the basis of a better theoretical understanding of what vagueness actually is.

3.1. Type I Vagueness, ("Sorites vagueness").

The most commonly cited examples of vague terms are those with which a sorites paradox can be generated. Hopefully the following examples will make this clear. But I also wish to emphasise that, although it is often the case that type I vague expressions can be used to generate sorites type paradoxes, there are also other examples of type I vagueness for which this is not true.[38] In order for a sorites type paradox to be generated, the underspecified condition must be a graded property. That is to say, it must admit of degree, such that along some dimension, it lacks a precise cutoff point. This must be the case in order for the

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38 Mohan Matthen has suggested that 'person' and 'material object' might be plausible candidates for being non-sorites, type I vague expressions.

induction step (or iterated conditional clause) to be possible. A non-sorites type I vague expression might arise, for example, if one of the applicability conditions for that expression depended upon a property which was itself vague, and there was no alternative non-vague way of specifying that property.

Whilst some type I vague expressions have simple qualification conditions, others do not. The important point to note is that it is only this kind of vagueness which can arise with expressions with simple qualification conditions. Thus, if an expression is vague and it has simple qualification conditions, it follows that it must have vagueness of type I. The two other kinds of vagueness can only occur when applicability conditions are complex. Type I vague expressions have at least one condition which is under-specified. In the examples which follow the under-specified condition will be marked by the inclusion of a variable (represented by a lower case letter). This is not to suggest that just any value may be substituted, nor to imply that there is no value which can be specified. Indeed, in the discussion of the example I will make suggestions of values for the variable. The purpose of using a variable is two-fold. First, it indicates that there is no one specific value for this magnitude. Rather, a range of values may plausibly be proposed. Secondly, the variable serves as a marker to indicate the exact source of the expression's vagueness.

Let's consider some examples of type I vague expressions. To begin with, consider the following specification of what it is for something to be red.

> An object, O, is within the scope of the term 'red', if and only if, under normal viewing conditions, o reflects light of a wavelength between w_1 and w_n Angstroms.[39]

The value of w_1 will be about 6470 Angstroms, and the value of w_n will be about 7000 Angstroms.[40] However, it is unclear (hence the inclusion of the hedging term 'about' in the previous sentence), what exactly the values of w_1 and w_n should be. There are instances where the term 'red' does apply obviously, for example, to old fashioned English telephone boxes. Uncontroversial examples of red things reflect light of a wavelength which is roughly in the middle of the range w_1 to w_n. The difficulties arise at Anstrom values close to w_1 or w_n. Even the range of acceptable values close to w_1 and w_n are left uncertain. The upshot of this is that the scope of the term 'red' is insufficiently defined at the boundary. Without w_1 and w_n being given precise values, it will be in principle impossible to tell whether or not the term 'red' applies to some objects.

It might be proposed that the values of w_1 and w_n should be stipulated exactly. This would make the specification above,

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39 It might be objected that the requirement of 'normal viewing conditions' could be another source of vagueness. I will ignore this. The values of w_1 and w_n are of the greatest significance for this example, as it is these values which would be used to generate a sorites paradox.

40 These values come from Weast, [1970: p. E206].

into a prescriptive rule for the application of the term 'red'. Unfortunately, there are a number of reasons why this proposal is problematic. Firstly, such a suggestion has strong counter-intuitive implications. It can only be justified if there are principled reasons for thinking the solution correct. This brings me to the second objection. Suppose it was proposed that the Angstrom values mentioned above should be substituted for w_1 and w_n respectively, without the inclusion of any hedging terms. Then it would be questioned as to why exactly these figures should be preferred to others of a few Angstroms more or less. There does not seem to be any principled reason to prefer one set of values over another. Hence, the stipulation remains to some extent arbitrary.[41]

It should not be supposed that the above objections rule out the use of precise values for w_1 and w_n under all circumstances. There may be situations in which precise values are required, for example in certain scientific or technical contexts. In these kinds of instances, principled justification for the values chosen may be possible. However, this justification would be dependant on the context of use.[42] The point here is just that there is no one general pair of values which can be given to w_1 and w_n; they are in principle indefinite. As such, the expression 'red', at least as defined above, is semantically vague.

41 Further objections to this kind of suggestion can be found in Sorensen, [1988: pp.236-239].
42 C.f. Wittgenstein, [1953: para. 69].

Without firm values for w_1 and w_n, there will always be certain cases for which it will be indeterminate whether or not the qualifications for being red are satisfied.

The semantic vagueness of the expression 'red', as defined above, might be taken as a good reason to reject the definition. The difficulty with this proposal is to find a plausible alternative. It might be proposed that a definition based upon a clear case of something red would suffice. For example, an object could be said to be 'red' if it had the same colour as an old British telephone box. This kind of definition runs into even greater difficulties than the first one proposed however. Firstly, old British telephone boxes are not all identical in colour. The effects of weathering means that the paint on some is more faded than the paint on others. Secondly, it seems fairly obvious that there are red things which do not have quite the same colour as an old British telephone box. If some attempt was made to stipulate a permitted degree of deviation from the colour of 'phone boxes, then either, the previously discussed difficulties of borderline cases would reimerge, or the problem of arbitrariness would be encountered. Moreover, it seems that similar objections could be raised to almost any conceivable definition of 'red'. This being the case, there seem to be good reasons for maintaining that 'red' really is semantically vague, until an unproblematic set of conditions can be found.

The term 'heap' is also type I vague. The reasons 'heap' is vague are similar to the reasons 'red' is vague. The conditions for something being a heap might be as follows,

> An object O is falls within the scope of the term 'heap', if and only if, (a) O is an unstructured contiguous collection of n items of H, and (b), the base of O is wider than its apex.

Almost anything can be substituted for H. H can be grains of sand or wheat, parts of agricultural machinery, bits of rubbish[43] or even the bodies of dead babies. Condition (a) specifies that a heap cannot consist of just one H. This is ruled out by 'collection'. Condition (b) rules out collections of H which are spread in a thin layer, or have any other kind of arrangement other than one in which the base is wider than the apex.[44] The problem is to decide on a value of n which is sufficient to meet this condition. It is fairly obvious that two or three H will be insufficient. To a certain extent this is an empirical question. A little experimentation with balls of screwed up paper, reveals that an absolute minimum of four balls of paper are required to meet condition (b). Thus, if H is balls of paper, then n must be greater than four. This value of n does not generalise however, even over the set of balls of paper. If one of the balls of paper was made of a sheet of paper one meter square, and the other three were made of pieces of paper one centimeter square, no matter how they were

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43 I take it that 'discarded things' can be a type of H.
44 In fact this condition may itself be an additional source of vagueness. However, I will not consider this further difficulty here.

arranged, it seems implausible that condition (b) could be satisfied. The vagueness of the term 'heap' comes from the fact that n is not adequately specified in the qualifications for an object, O, being a heap. Furthermore, it seems to be in principle impossible to specify an adequate general value for n.

Other examples of type I vague expressions can be generated in a straightforward manner. Every expression which is type I vague, will have at least one qualification condition which is inadequately specified. Another type I vague term, for instance, is 'city'. Alston [1964: p.86], gives this as an example. 'City' is not a totally unproblematic example however, as it is a lexically ambiguous word.[45] If the qualification condition for the applicability of 'city' is taken to be the number of inhabitants (as Alston takes it to be), then 'city' is type I vague. On the other hand, if the qualification condition is taken to be having a charter, or having a cathedral, then 'city' is not vague at all. On a third hand, 'city' may also fall under the other types of vagueness. Which type of vagueness the term has will depend upon how the conditions in the intension are specified.

3.2. Type II vagueness, ("Family resemblance vagueness").

It should be immediately pointed out that the use of the label 'family resemblance vagueness' is not supposed to imply that this is an analysis of the Wittgensteinian

45 See the definition given in section 1.1. of Chapter 2.

concept of family resemblance.[46] Nonetheless, the term is appropriate, as a number of Wittgensteinian family resemblance concepts do exhibit this kind of vagueness (see the example below of the term 'game').

The qualification conditions for a type II vague expression are complex. The conditions may often have the form of an open conjunction (see section 3. above). The reason for this is that with this type of vagueness it is not necessary for all the qualifying conditions to be fulfilled in order for the vague term to apply. It may be the case that some qualifications are more important than others, but with a type II vague term it is not definite which qualifications are the most important. Indeed, it may even be the case that all the relevant qualification conditions for the application of a particular expression are not known! However, if all the conditions were specified, and a particular object satisfied them all, then that object would definitely fall under that term. But such situations are rare.

Expressions of this type have a number of significant features, all of which play a role in determining the

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46 The way the term 'family resemblance is used here, is significantly similar to what Bellaimey [1990] calls "the basic predicates solution" version of family resemblances. For a discussion of this, and the reasons why the notion is not the same as the Wittgensteinian concept, see Bellaimey [1990: pp. 33-36]. The exact nature of the Wittgensteinian notion of family resemblances is still a somewhat controversial matter. In the rest of his paper, Bellaimey discusses other proposed interpretations.

applicability of the expression to particular objects. None of these features however, are necessary or sufficient conditions for the applicability of the term. Suppose a particular type II vague expression R was known to have only four applicability conditions, (C_1, C_2, C_3, C_4). If all the conditions were satisfied by an object o, then o would be within the scope of R. That is to say, o would be a member of the set of things named by R. Suppose that another object o^* only satisfied conditions C_1 to C_3. It might be reasonable to think that o^* might be within the scope of R, but this is by no means certain. Although individual conditions may not be necessary or sufficient, certain subsets of the set of conditions, when found together may be sufficient. This being the case, an object which satisfied C_1 and C_3 may not be within the scope of R, whilst another object which satisfied C_1 and C_2 may well be within the scope of R. This can be made clearer by considering an example.

The expression 'religion' is type II vague. Alston [1964: pp. 88-89] discusses this term in some detail. He gives nine features which a cultural entity may exhibit and which increase the plausibility of terming that cultural entity 'a religion'. They may be paraphrased as follows.

1. Belief in supernatural beings (gods).

2. A distinction between sacred and profane objects.

3. Ritual acts focused around sacred objects.

4. A moral code, sanctioned by the gods.

5. Religious feelings associated with certain objects and acts which are linked with the gods.

6. Prayer and other forms of communication with the gods.

7. A world view which includes a specification of the role of the individual.

8. An amount of organisation of a believers life around the world view.

9. A social organisation bound together by the preceding characteristics.

When a cultural entity has all these features, it is a clear case of a religion. Alston suggests that paradigm examples of religions are Roman Catholicism and Orthodox Judaism. The problems arise over cultural entities which satisfy only some of the conditions. A good example of a problematic case of a religion is Hinayana Buddhism. Hinayana Buddhism clearly satisfies conditions seven, eight and nine. It has features roughly similar to conditions three and four. It has a strict moral code (but not a theistically motivated one) and certain texts are revered. However, it explicitly does not satisfy any of the other conditions, as it denies the existence of either a God or gods. Keeping these facts in mind, it is hard to be sure whether or not Hinayana Buddhism falls within the scope of the term 'religion'. If Hinayana Buddhism is to count as a religion, then it seems that Communism must also, as it satisfies the same conditions. Indeed, it might be argued that it satisfies

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47 For a brief description of the main features and doctrines of Hinayana Buddhism, see Reese [1980: p.72].

even more conditions than Hinayana Buddhism! There are other problematic examples also. Do the practices of the Quakers or the Unitarians satisfy a sufficient number of conditions to fall within the scope of the term 'religion'? Given the number of conditions which Freemasonary satisfies (almost all of them), should it be classified as a religion despite the protestation of its practitioners? There are no easy answers to these questions, because the term 'religion' is type II vague.

A further point to note however, is that certain conditions in combination, seem to be sufficient conditions for a cultural entity being a religion. Suppose an anthropologist was to study a previously unknown tribe on an isolated desert island. After having managed to master the difficulties of learning their language, she could begin to scrutinize their culture. Were this anthropologist to discover that the tribe believed in gods who authorised the moral system by which the tribe lived, then the anthropologist would believe (and would be justified in believing) that this cultural entity was the religion of the tribe. Even if none of the other conditions were met, it seems that this would be the case. But this is just to say that the conjunction of conditions one and four may be sufficient to make a cultural entity fall under the term religion. If this is the case, then the conjunction of conditions one and four is a sufficient condition (though

not a necessary condition), for a cultural entity to be a religion.

Another term which is type II vague is 'game'. This is a classic family resemblance notion, both in the Wittgensteinian sense, and in my deviant sense. The application conditions for 'game' have the form of an open conjunction. That is to say, we do not know what all the conditions are. Wittgenstein [1953: paras. 3 and 66] proposes various conditions as being salient to the applicability of 'game', but none of them is essential, as there are counter-examples of games which do not satisfy each proposed condition. 'Having pieces' is one proposed condition, but blind man's buff does not involve the use of pieces. Russian roulette can hardly be described as amusing to its players, so 'being amusing' is not a general condition either. Many games involve winning and losing, but catch played against a wall does not. No element of competition is included in solitare either. Some games require skill, but a game of dice needs no skill at all, only luck. Then again, not every game requires luck. There is little or no luck involved in chess, and a game of ring-a-ring-a-roses requires no luck at all. Numerous other conditions may be proposed, but the ones already mentioned are the obvious qualifications for 'gamehood', and none of them is necessary to something being a game. This being the case, it seems likely that other conditions which are proposed will also meet problematic counter-examples.

The lack of clear qualification conditions for determining whether or not an activity is a game (i.e. the problems with the intension of the term) means that there are borderline cases of games (i.e. 'game' is extensionally vague). For example, would it be correct to term sexual play between two lovers a 'game'?[48] 'Game' has all the features one would expect to find with an expression which is type II vague.

A third example of a type II vague expression is 'sufferer from schizophrenia'. This expression is similar to the religion example discussed above. The qualification conditions for a person, p, to fall within the scope of the expression 'sufferer from schizophrenia' are something like the following,

(1) p exhibits a disconnection between thoughts, feelings and actions.

(2) p is subject to delusions.

(3) p retreats from social life.

(4) p suffers from hallucinations.

(5) p's word use is idiosyncratic.

(6) p behaves in a manner inappropriate for the circumstances.

(7) p is hypochondriac.

(8) p attempts to attain impractical goals.

(9) p has difficulties distinguishing between the concrete and the abstract.

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48 This seems an apposite point to note that the expression 'sexual perversion' is also type II vague. The difficulties which arise when wrestling with this kind of vague expression are clearly exemplified in Nagel [1969: pp. 76-77].

(10) p is paranoid.

(11) p claims to have psychic powers.

(12) p exhibits some of the above symptoms for at least six months.[49]

As with the religion example, an individual which satisfied all these conditions would be a clear case of a sufferer from schizophrenia. However, when only a few of the conditions are satisfied by a particular individual, it will be indeterminate whether or not that individual is a 'sufferer from schizophrenia'.

It might be suggested that this type of vagueness can be reduced to type I vagueness, by considering the number of conditions which must be fulfilled in order for an object to fall within the scope of a particular type II vague term, and then generating a sorites argument. The argument would run something like this.

(1) An object x which satisfies all of C_1 to C_n is an S.

(2) If an object x satisfies k-many of C_1 to C_n and is an S, then any object x^*, which satisfies (k-1)-many of C_1 to C_n will be an S.

(3) Hence, all objects are S.

This sorites argument is only plausible if none of the individual conditions C_1 to C_n, are either necessary, or sufficient, for an object to fall within the scope of S. However, given the argument offered above in connection with

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49 These conditions derive from American Psychiatric Association [1987].

the term 'religion', to the effect that certain conjunctions of conditions may be sufficient, the claim that the sorites is plausible seems to be considerably weakened. The second premise of the sorites depends upon the varying the number of conditions which an object has to satisfy in order to be S. However, conditions will not necessarily fall into a natural graded sequence. Some conditions may be more important than others. This being the case, it is obvious that the second premise of the sorites may be false in some instances. If the conditions for x to be S are ordered in a particular way, then it may so happen that x is an S, whilst x^* is not (where x satisfies exactly one more qualification condition than x^* does). Whether or not this is the case will depend upon the importance of the condition satisfied by x, but not by x^*, and the importance of the other conditions which they both satisfy. Thus, despite the initial appearance, a sorites cannot always be generated by considering the number of conditions which need to be satisfied. Thus, the attempt to collapse type II vagueness into type I vagueness will not be successful in every case.

Even if it were possible to generate sorites type paradoxes with type II vague expressions, there are still good reasons for maintaining that the two types have different features, and therefore should be kept distinct. Firstly, with type I vague expressions like 'heap' all the qualification conditions are known. While this may be the case for some type II vague terms also ('religion' might be an example),

others (e.g. game) have conditions which form an open conjunctions (i.e. the complete list of conditions are not available). Intuitively, 'religion' and 'game' seem to have much more in common than 'religion' and 'heap'. This being the case, it seems much more appropriate to group 'religion' with 'game' than with 'heap'. Secondly, in type I vagueness sorites paradoxes are generated by the variation of some magnitude which is inadequately specified in one of the conditions. In type II vagueness however, all the conditions may be perfectly clear in themselves, it is their relation to one another which is problematic. These two things are not the same. One could not generate a sorites paradox by varying the number of conditions an object had to satisfy in order to a heap (see the conditions outlined above). If even one condition was not satisfied, then the object in question would fail to be a heap. One final minor difference between types I and II vagueness is that it is possible for an expression to have a simple qualification condition, and be type I vague. However, in order for an expression to be type II vague, it is necessary that the qualification conditions are complex. Given these objections, it seems much more plausible to maintain that type I and type II vagueness are distinct. This is not to claim however that the two types are mutually exclusive. As noted earlier, it is possible that there are some expressions which have both kinds of vagueness.

3.3. Type III, ("Conflict vagueness").

There are certain similarities between types II and III vagueness. In fact, it may be the case that type III vagueness is merely a special case of type II. However, as type III vague expressions have features which type II do not, this seems a sufficient reason to distinguish the two kinds. The most noteworthy of these distinguishing features, is that the conditions for application of expressions of type III actually come into conflict with one another in certain instances. This is not the case with the applicability conditions for type II vague expressions. For example, none of the conditions for the term 'religion' are such that if they are satisfied, then other conditions are precluded from satisfaction. It is also the case that type III vague expressions often have fewer qualification conditions than expressions of type II.

Expressions which are type III vague have applicability conditions which are complex. What causes vagueness of this type is that in certain cases, the qualification conditions conflict with one another. This type of vagueness is significantly similar to Mellor's [1965] notion of 'conceptual imprecision'. The difference between this type of vagueness and conceptual imprecision is that conceptual imprcision applies to variable terms, whilst this type of vagueness occurs in non-variable expressions. The upshot of this is that whilst conceptual imprecision may be removed

(according to Mellor [1965: p. 111]), "by ascribing a definable imprecision to its [i.e. the variables] value"; type III vagueness cannot be removed.

Type III vagueness is easiest explained by giving an example. Haack [1974: p. 111] gives Quine's [1960: p. 128] example of the term 'tributary', as does Mellor [1965: p. 111]. There seem to be three conditions which may be used to distinguish a river from its tributary: volume of flow, length, and whether or not the two bodies of water are connected. The difficulty which type III vagueness presents comes about from the the logical relations between the conditions. It is obvious that the condition of interconnectedness of the two streams is vital. The relation between the other two conditions is more problematic however. The conditions for one channel being the tributary of another might be something like the following,

> A stream of water, S_1, is within the scope of the term 'tributary of S_2', where S_2 is another stream of water which is connected to S_1, if and only if, (a) the volume of water passing along S_2 in time t is greater than the volume of water passing along S_1 in t, or (b), the length of S_2 is greater than the length of S_1.

The 'or' between conditions (a) and (b) has to be inclusive, as in most cases tributaries are both shorter and of a lesser volume than the stream which they join. The Kennet is shorter and less voluminous than the Thames. Likewise, the Nidd is considerably shorter and has a lower rate of flow than the Wharf. So, in most circumstances, this

specification of qualification conditions will determine which of two converging streams of water is the tributary of the other. It is not the case that there should be a conjunction between conditions (a) and (b) however. Difficulties arise when two water bearing channels converge and one is shorter than the other, but carries a greater volume of water than the other. This is just what happens if one attempts to judge whether the Missouri is a tributary of the Mississippi, or vice versa. If the conditions (a) and (b) were related to one another by a simple conjunction, then neither the Mississippi nor the Missouri could be a tributary of the other. This is obviously not correct. This is the reason why (a) and (b) must be connected by an inclusive disjunction. The difficulty however, is that in this kind of circumstance, given the conditions (a) and (b) above, both bodies of water satisfy the conditions for being a tributary of the other. This also does not seem adequate as there is a commonly made, but problematic, assumption in the background. This is that when two streams meet, only one of them is the tributary of the other. Mellor [1965: p. 111] explains this problem in the following manner,

> "A precise definition of 'tributary' could easily be given were it not that one wishes to draw several logically distinct inferences: that the tributary is shorter than the river, that it has a smaller volume of flow, etc. But as the two properties (of being shorter, of having the smaller flow) do not always correlate, the term 'tributary' cannot always be applied without falsifying one or other accepted relation."

There is a conflict between the assumption that only one of two converging streams can be the tributary, and the qualification conditions for something being a tributary, in these problematic cases. The result of this situation is that the truth-value of sentences like (xv) remains indeterminate.

(xv) The Missouri is a tributary of the Mississippi.

Although in many cases '...is a tributary of...' can be used unproblematically, it also has borderline cases, like (xv). An expression with a borderline case is vague.

It is worth mentioning that there is another way of getting around the problems which arise over deciding which of two converging streams is the tributary of which; that is to use different terminology all together. For example, rather than trying to judge whether or not the North Saskatchewan is a tributary of the South Saskatchewan, or vise versa, an alternative strategy is adopted. This is to simply say that the two rivers meet at a certain point (their confluence), and downstream the common flow is called the Saskatchewen River. Similarly, downstream of where the Red Nile meets the Blue Nile, the river is simply known as the Nile.

In fact, the conditions for one stream being a tributary of another are a little more interesting than the specification of conditions outlined above would initially lead us to believe. Suppose one were to take the existence of

problematic cases as being an indication that only one of the conditions (a) or (b) should be used in deciding which of two converging streams was the tributary. There is no immediately obvious reason for preferring one condition over the other. One way of resolving this dilemma would be to appeal to a member of the community of experts on the subject of tributaries.[50] Indeed, in the literature on vagueness, from time to time one finds the suggestion that problematic cases can be resolved by appealing to the relevant community of experts. This strategy does not always work however. In the case of tributaries, the relevant expert would be a geomorphologist. Unfortunately, geomorphologists neither have overtly stipulated conditions for one stream being a tributary of another, nor do they even have a definition of the term 'tributary'.[51] Geomorphologists just employ a common sense notion of tributary, as this suffices for most cases.

Another, slightly different, example of an expression which appears, at least initially, to be type III vague might be the term 'fruit'. Alston [1964: p. 87] uses this example in his discussion of vagueness. 'Fruit' is an ambiguous word, it has different meanings depending on whether or not it is

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50 That is to say, knowing the precise criteria for something being a tributary, should be part of the 'linguistic labour' done by the community of experts. See Putnam [1975: pp. 227-229].

51 I have this information on the authority of Dr. R. B. Rains, a geomorphologist who holds the position of Associate Professor in the geography department at The University of Alberta.

being used in the biological sense, or in a culinary sense. In the biological sense, fruit is the part of a plant or tree which carries the seeds. Clear cases of fruit in this sense are strawberries, watermelons, apples and mangos. There may also be unclear cases of the biological sense of the term 'fruit', however I am not aware of any. The culinary sense of 'fruit' is more difficult to specify. Alston suggests that it should be contrasted with the culinary sense of the term 'vegetables'. This contrast gives rise to a problematic background assumption, similar in role to that in the tributary example. The assumption is, that something cannot be both a fruit and a vegetable at the same time. Paradigm cases of vegetables in the culinary sense might be, turnips, cabbage, leeks and potatoes. Now, the biological sense of the term 'fruit' seems to have some bearing upon the culinary sense. The examples of fruit mentioned above, all seem to uncontroversially fall within the scope of both senses. However, an object being a fruit in the biological sense is not sufficient to guarantee that it will also be a fruit in the culinary sense. Peas, tomatoes and peppers all satisfy the biological condition, without being fruit in the culinary sense.

Alston suggests another condition for something being a fruit in the culinary sense: being naturally sweet, or usually served in a sweetened form. This again does not appear to be an adequate qualification for something being a fruit, at least not on its own. Tapioca is almost always

eaten in a sweetened form, yet it is certainly not a fruit in either the culinary sense or the biological sense. (Tapioca also fails to satisfy the first condition as it comes from the root of the cassava plant). It might be proposed that the two proposed conditions be used in conjunction. This would make the qualification conditions for something to be a fruit in the culinary sense take the following form:

> An object O is a fruit, if and only if, (a) O is the seed bearing part of a plant or a tree, and (b) O is naturally sweet, or is usually eaten in a sweetened form.

Despite the initial plausibility of this proposal, there are still problematic counter examples. Alston, notes that although pumpkins satisfy both conditions, it is not clear that they are usually considered to fall within the scope of the culinary sense of fruit. Furthermore, there are examples of items which fulfill the second conjunct and not the first which are often thought to be fruit. Rhubarb is a reasonable candidate for 'fruit-hood'.[52] Rhubarb is always eaten in a sweetened form (thereby satisfying (b)), yet it comes from the stalk of the plant (i.e. it does not satisfy (a)). If rhubarb is taken to be a fruit in the culinary sense, then it seems that although the conditions for something being a fruit are (apparently) clear, it is not always the case that they both have to be satisfied. Replacing the conjunction

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52 Alston [1964: p. 87] even claims that there was once, in Canada, even a legal case which turned on whether or not rhubarb was a fruit.

between conditions (a) and (b) will not help matters, as it would make peas, beans, etc. fruits in the culinary sense. In the case of the term 'fruit', it appears that there is no consistent relation between the two qualifying conditions that an object must meet to fall within the scope of the term. This seems to be indicative that the expression 'fruit' may well exhibit conflict vagueness. (Note also, a similar kind of analysis might be feasible for the expression 'culinary vegetable').

The diagnosis made above about the vagueness of the expression 'fruit', in fact is false, for two reasons. Firstly, the background assumption, that something cannot be both a culinary fruit and a biological or culinary vegetable at the same time, is simply false. This makes its role in the reasoning above illigitimate. Secondly, there is a third condition which plays a role in determining 'fruithood'. Whether or not we usually call a particular vegetable product 'a fruit' also depends upon the circumstances under which it is usually consumed. That is to say, the third condition is sociological in nature. The third condition might be expressed something like this:

> (c) O is habitually eaten at the end of a meal, or as a snack.

With this third condition added to the specification of qualifying conditions outlined above, it becomes clear that 'fruit' is neither type I nor type III vague. Rather, 'fruit' is type II vague. The apparent conflict between the

qualification conditions arises because not all the conditions have to be satisfied, and the reasoning is lead astray by a false background assumption.

The reasons for discussing this example (even though it is flawed) are straightforward. Examples of type III vague expressions are fairly rare.[53] It is unusual for qualifying conditions to come into conflict with one another, so clear examples of type III vague expressions are hard to find. Nevertheless, the 'fruit' example does go to illustrate both the similarity between types II and III vagueness, and the fact that there are subtle differences between the two. Even if my type III vagueness is really just a special case of type II vagueness however, hopefully from the discussion of examples above, it is clear that there is more to vagueness than just sorites cases.

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53 Another possible example of a type III vague expression is the term 'evolutionary unit', as understood by a traditional systematist. See Gould [1983: p. 364]. If the notion of conflict vagueness is broadened, to include Mellor's [1965] imprecise concepts, then there would be a much larger number of examples. In his paper, Mellor [1965: p. 110] claims that there are good reasons to believe that all empirical variables are imprecise.

V

Conclusion.

The purpose of the discussion and argument of the last hundred pages or so, was to take a few small steps towards removing some of the confusion which surrounds the notion(s) of vagueness. Having distinguished vagueness from other features of language with which it gets confused, I then attempted to show how little consensus about vagueness exists even in the literature concerning the subject. There seem to be almost as many conceptions of vagueness in play as there are authors on the subject.

In the preceding chapter I have given a criterion for vagueness. I have also argued that the primary bearers of vagueness must be expressions. More importantly however, I have also argued that there is, in fact, more than one distinct kind of vagueness. Moreover, I claim that these different types of vagueness have significantly different characteristics, and for the most part will not collapse into one another.

The identification of at least two, and possible three distinct types of vagueness may go some way to explain the conceptual confusion about the topic in the literature. It also may be of some use in accounting for the diversity of views over the various philosophical problems that vagueness gives rise to. The observations and arguments offered here, if they are for the most part correct, indicate that future

attempts at solutions to the problems to which vagueness gives rise to, must employ a more sophisticated account of vagueness than has hitherto been the norm. There is even a possibility that some of the strategies proposed so far for handling vagueness may be more successful for one particular kind of vagueness than the others. Whether or not this is the case deserves further investigation.

It is important to note however, that there may be more than just three kinds of vagueness. The examination offered here is only a first attempt at trying to come to grips with the internal structure of natural language vagueness. Hopefully at some point in the future, more work will be done which will make it clear whether or not a yet more subtle analysis of vagueness is required. There may be other kinds of vagueness which I have missed, or some of the categories which I identify may have a more complex internal structure than I have supposed. Again this bears further investigation.

One of the striking things about the current state of play in the study of vagueness is the lack of empirical data on the subject. As far as I have been able to ascertain there is almost a complete dearth of information about the way non-philosophical speakers of a natural language understand and handle vagueness. Most studies (regrettably, including this one) depend upon the linguistic intuitions of the author, supplemented by the claims of previous writers on

the subject. If detailed psychological studies of vagueness were undertaken, doubtless many new and surprising facts of considerable importance would come to light. The 'introspective' approach currently employed in the study of vagueness has been shown to be unreliable on more than one previous occasion. More important for the current context however, is that if the thesis proposed here is correct, it may well gain further support from experimental results.

Some attempt at testing the hypothesis outlined in the preceding pages may be not just of philosophical interest. As I briefly noted in section 1.2. of chapter IV, there are significant similarities between at least two of the kinds of vagueness identified above (types I and II), and two of the non-classical categories identified by Lakoff [1987] (graded and radial categories). Were these apparent similarities to turn out to be genuine, the empirical study of vagueness might produce results which would be of use to the further study of non-classical category theory. Furthermore it may also be the case that, if there are any as yet undiscovered types of vagueness, they may correspond to other categorical types which Lakoff claims to identify. Hard research will be required in order to find out whether there is anything to this proposed connection, or whether it is mere idle conjecture.

There is also further work which needs to be done with the types of vagueness which I have identified. The case for the

existence of three distinct categories of vagueness would be considerably strengthened if it could be shown that these three types could handle unproblematically a much larger range of examples than I have given above. Attempts to test this are also liable to draw attention to anomalies, and thereby assist in the identification of other kinds of vagueness. Moreover, such experimentation might reveal whether or not type III vagueness is a special sub-class of type II vagueness, or whether it should be given the status of an autonomous class.

Examples from natural languages other than English would also present an interesting and enlightening challenge to my distinctions. Another possibly fruitful line of investigation would be to discover whether or not theories of meaning other than that which I have employed could be used to isolate the same types of vagueness. Incidentally, if empirical support could be found for my categories, and no other theories of meaning could be employed to make similar distinctions, then the conjunction of these results would serve to bolster belief in the correctness of theories of meaning which are based upon the intension/extension distinction.

By way of conclusion, I make a request of the reader. If the arguments found in the preceding pages are judged to be cogent, then the next time someone begins to talk of this or

that expression being vague, consider asking him or her which kind of vague they mean.

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